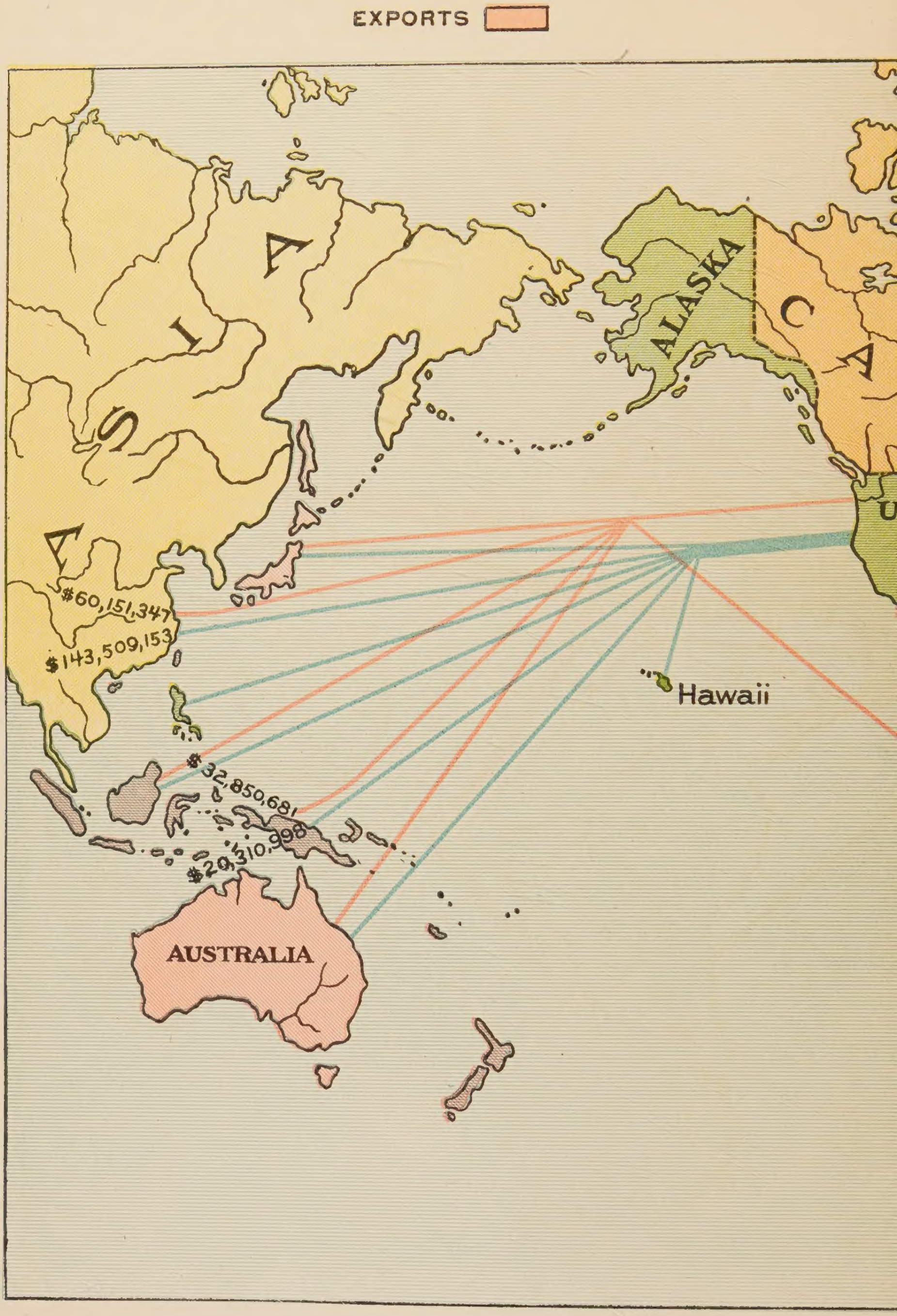
Digitized by the Internet Archive
in 2022 with funding from
Kahle/Austin Foundation

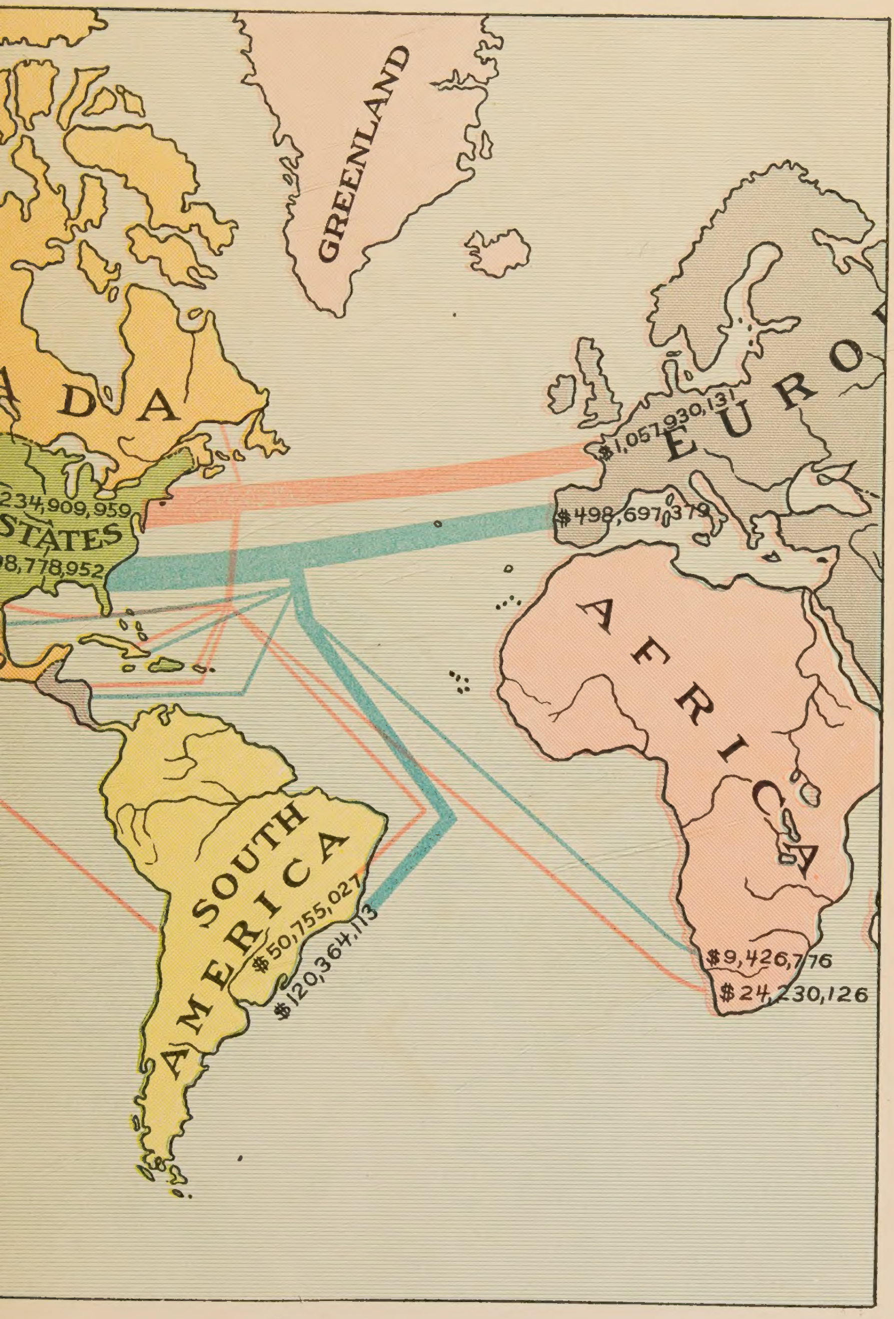
https://archive.org/details/makingofamericat0004robe

AMERICAN IMPORTS AND EXPO



EIR RATIO AND DESTINATION

IMPORTS 🟦



103
L25
v.4

The MAKING OF AMERICA

Editorial Edition

limited to one thousand copies
of which this is No. ____

Robert Marion La Follette
Editor-in-Chief

William M. Handy
Charles Higgins
Managing Editors

VOL. IV

Trade and Commerce

The Making of America Co.
Chicago

064515

CONCORDIA COLLEGE LIBRARY
BRONXVILLE, N. Y. 10708

Copyright 1905 by John D. Morris & Company
Copyright 1906 by The Making of America Co.

CONTENTS

VOLUME IV.

TRADE AND COMMERCE.

American Trade and Commerce.
BY VICTOR H. METCALF.......1

Natural Resources of the United States.
BY CYRUS C. ADAMS.......18

Expansion of American Commerce.
BY O. P. AUSTIN.......33

Foreign View of American Competition.
BY FREDERIC EMORY.......51

Early American Commerce.
BY W. J. ASHLEY.......65

The Beginnings of America's Foreign Trade.
BY WORTHY P. STERNS.......89

Foreign Trade of the United States.
BY FREDERIC EMORY.......110

Progress and Promise in American Shipbuilding.
BY LEWIS NIXON.......119

Present Status and Future Prospects of American Shipbuilding.
BY JOHN FRANKLIN CROWELL.......129

The Commerce of the Great Lakes.
BY RAY STANNARD BAKER.......141

Romance of the Steamboat.
BY C. C. FITZMORRIS.......152

The Modern Grain Elevator.
BY DAY ALLEN WILLEY.......163

Some Engineering Problems in the Panama Canal.
BY JOHN FINDLEY WALLACE.......170

The Isthmian Canal in Its Economic Aspects.
BY EMORY R. JOHNSON.......181

The Railroad's Part in Our Commercial Development.
BY GEORGE H. DANIELS....199
The Past, Present and Future of American Railways.
BY MELVILLE E. INGALLS....217
Bewildering Statistics of American Railway Operation.
BY GEORGE B. WALDRON....228
The Development of American Railways.
BY STUYVESANT FISH....234
The Social and Economic Effects of Railroads.
BY CHARLES BARNARD....244
The Nation's Debt to Railroads.
BY JAMES J. HILL....253
American Transcontinental Lines.
BY JAMES DOUGLAS....270
Railway Regulation.
BY ROBERT M. LA FOLLETTE....294
Control of Railway Rates.
BY CHARLES A. PROUTY....348
Government Ownership of Railroads.
BY MARTIN A. KNAPP....355
Railroad Organization.
BY GEORGE T. SAMPSON....367
The American Locomotive.
BY JOHN H. CONVERSE....384
Development of Steel Railroad Cars.
BY GEORGE A. HUTCHINS....390
American Supremacy in Bridge Building.
BY THOMAS CURTIS CLARK....394
American Bridge Construction.
BY HENRY S. JACOBY....400
Interurban Railways—Economic, Financial and Social Features.
BY EDWARD DANA DURAND....416
Past, Present and Future of Electric Traction.
BY FRANK J. SPRAGUE....442
The New York Subways.
BY JAMES CREELMAN....451

Early Days of the First Telegraph Line.
BY STEPHEN VAIL....................................460
Recent Progress of the Telegraph.
BY MORTIMER W. COURTWRIGHT..........................480
Submarine Telegraphs.
BY FREDERIC ROYCE..................................487
The Automobile in America.
BY JOHN FARSON.....................................500
The American Salesman.
BY EDWARD W. DE BOWER..............................506
The Extension of our Domestic and Foreign Trade.
BY GEORGE BRUCE CORTELYOU..........................514

AMERICAN TRADE AND COMMERCE.

BY VICTOR H. METCALF.

[Victor Howard Metcalf, secretary of commerce and labor, born Oct. 10, 1853, in Utica, N. Y.; was graduated from the Utica Free academy and Russell's Military academy, New Haven, Conn., and in 1876 from Yale Law school; the same year he was admitted to the bar of Connecticut and the following year to the New York bar; after practicing law in Utica for two years he removed to California, where he has been a member of the firm of Metcalf & Metcalf ever since 1881; in 1899 he was elected congressman for the third California district; appointed secretary of commerce and labor, 1904.]

The United States has become, within recent years the greatest manufacturing nation of the world. In 1860 the United States stood at the bottom of the list of the four great manufacturing nations, namely, United kingdom, France, Germany and the United States. Now she stands not only at the head of the list, but her manufactures are equal to those of the other three nations combined. The figures which I shall quote to show the relative growth of manufacturing in the four great industrial nations of the world are necessarily estimated as relates to all other nations except our own, because the United States is the only country which takes a complete census of its manufacturing industries; but the estimates are those of men who have given careful study to this subject and, so far as I am aware, their reasonable and approximate accuracy has never been called in question. The late Michael C. Mulhall, the celebrated English statistician, estimated that in 1860 the manufactures of the United kingdom were $2,800,000,000, of France $2,092,000,000, of Germany $1,995,000,000, while the census of the United States puts our total manufactures for that year at $1,886,000,000. In 1904 Mr. William J. Clark estimated the manufactures of the United kingdom at $5,000,000,000, of Germany $4,666,000,000, of France $3,500,000,000, while the census of 1900 gave the manufactures of the United States as $13,000,000,000, making our total of 1900 practically equal to the estimated aggregate of the United kingdom, Germany and France at the date covered by his estimate of 1904. The same authority also estimated the value of manufactures in Austria-Hungary at $2,000,000,000; Russia a little less than $2,000,000,000, Italy $1,750,000,000, Canada $800,000,000, and Belgium $750,000,000. It is quite apparent, therefore, that the world's chief producers of manufactures are the United States, the United kingdom, Germany and France, and that the manufactures of the United States alone are nearly, if not quite, equal to those of her three principal competitors—the United kingdom, Germany and France.

Yet a further study of the world's figures with reference to manufactures, and especially those entering into international commerce, shows that the United States, the greatest manufacturing nation, supplies at present but a small proportion of the manufactures entering the markets of the world. The total value of manufactures entering the world's international markets, determining this grand total by the aggregation of the manufactures exported country by country the world over, is, in round terms, $4,000,000,000.

Of this grand total of $4,000,000,000 entering international commerce, the United States supplies, but $500,000,000 or 12½ per cent, although she is by far the largest manufacturing country of the world.

Why is this true? Why is it that the United States, the world's greatest manufacturer, supplies so small a share of the manufactures consumed by the various nations of the world? We are the world's greatest producer of the principal articles required for manufacturing. We have the world's greatest supply of coal for turning these materials into manufactured form, the best machinery, the greatest supply of capital for production in large quantities, thereby reducing the proportionate cost of production, the cheapest transportation for assembling the natural products and carrying the manufactured products to the seaboard, the most ingenious and industrious workmen, and our manufacturers are a body of extremely intelligent, energetic and successful business men. Why, then, do we, with all these advantages, supply such a small proportion of the world's requirements in manufactures? This is a question which we not only have the right to ask, but it is one which we should carefully consider and try to reach intelligent conclusions. Prior to 1896 we held second rank in the exportation of domestic products, but in that year the exports of the United States exceeded those of any other nation and that has been the case in a large proportion of the years since that time. We need to have no anxiety in regard to our standing as a general exporter of domestic merchandise.

The world wants the products of our fields and mines, and is buying them freely. We are the world's greatest producer of national products, such as breadstuffs, meats, cotton, coal, timber, iron, copper, mineral oil for illuminating purposes, and many other articles, and the world takes all that we can produce of these products in excess of the wants of our own people. It is to manufactures, therefore, that we must turn our attention in the development of our export trade and in studying the opportunities for enlarging our sales throughout the world. Considering only the net value of our manufactures and eliminating from consideration those not classified with manufactures in the statement of our export trade, it may be stated that but about 8 per cent of our manufactured products, as classified in our export statements, find their way to foreign markets, while the remaining 92 per cent are consumed by our own population. While our manufacturers naturally look first to the great home market—a market which, of itself, exceeds that offered by all the nations of the world, the fact that our production of manufactures is increasing far more rapidly than our population suggests that it is of especial importance to us to carefully consider the great markets open in other parts of the world and the causes which have prevented a greater participation by us in the work of supplying those markets. The sales of our manufactures has grown from $1,000,000,000 in 1850 to $13,000,000,000 in 1890. and $15,000,000,000 in 1905, and is thus fifteen times as much to-day as in 1850, while our population has scarcely quadrupled since 1850. It is then apparent that our manufacturing industry is rapidly gaining upon population, and that duty to the country and duty to ourselves is to determine the methods by which the distribution of the surplus products to other parts of the world may be increased.

The importation of manufactures by all the nations of the world, as I have already stated is, in round terms, $4,000,000,000, and our exports of manufactures in the calendar year 1904 $500,000,000, or 12½ per cent of the grand total of manufactures imported by all the great nations of the world. Of these $4,000,000,000 of manufactures imported, about $800,000,000 were manufactures of iron and steel, and $600,000,000 manufactures of cotton, yet we, as the world's greatest producer of pig iron and raw cotton, supplied but a little more than $111,000,000 of the manufactures of iron and steel, and $22,000,000 worth of the manufactures of cotton thus entering the international trade.

This great market for manufactures, a market amounting to $4,000,000,000, or eight times as large as our total exports of manufactures in the calendar year 1904, the year of our best record in exports of manufactures, is distributed over the entire world. Every country is in a greater or less degree an importer of manufactures. Even the European countries, which are themselves great manufacturers import largely articles classified as manufactures, but they are in most cases but partially manufactured and intended for use in producing the finished manufactures which these countries in turn distribute to those continents and nations which have no well-developed manufacturing industries. In the lower grades of manufactures, such as pig copper, pig iron, bars of iron and steel, lumber, timber and other articles of this character, mineral oil, of which the labor required for the manufacture forms but a small proportion of the value represented, Europe is a large importer and draws largely from the United States. It is in the other parts of the world, however, Asia, Africa, South and Central America, and Mexico, Australia and Oceania, that the great markets for finished manufactures exist, and it is therefore to these sections of the world which take finished manufactures and which now take them chiefly from countries other than the United States, that our manufacturers must look for the enlargement of their markets for finished manufactures.

Our European market for pig copper and bars of iron and steel, mineral oil and certain articles of finished manufacture takes care of itself and accepts without material effort on our part practically one-half of our present total of manufactures exported. It is in the markets of Asia, Africa, South and Central America and Mexico, Australia, and Oceania, that we must look for an enlargement of our sales of the other half—the higher grades of manufactures, of which labor forms so important a part, and in which, therefore, we must expect to find an outlet for the products of that portion of our labor not required in supplying the demands of the home market. The value of manufactures imported into Asia and Oceania aggregates approximately $700,000,000 per annum, and of this we supplied in 1904 only $65,000,000, or less than 10 per cent. The total imports of South America amount to $382,000,000, and of this we may assume that more than one-half, or approximately $200,000,000, is manufactures, and of that total we supplied in 1904 but $35,000,000. The total imports of Africa amount to $450,000,000 annually, of which presumably considerably more than half are manufactures, and of this we supplied in 1904 but $13,000,000 worth. Thus the value of the manufactures imported into Asia and Oceania, Africa and South America, is approximately $1,200,000,000 annually, and of this we supplied but a little more than $100,000,000 worth, or, certainly, at a liberal estimate, not more than 10 per cent of their total importations of manufactures.

What nations supply the other 90 per cent of this grand total of more than $1,000,000,000 of manufactures imported by these countries? Clearly the bulk of that 90 per cent must come from the nations of Europe. No other countries of the world except Europe and the United States can be classed as manufacturing nations in the sense of producing in excess of the wants of their own population. If we, in the United States, are supplying but 10 per cent of this enormous importation of manufactures, it is quite apparent that the nations of Europe are supplying most of the other 90 per cent, yet those nations come to us every day in the year and buy our raw material or material in a slightly manufactured state for use in producing the very articles which we manufacture and which they sell in enormous quantities to those countries in which we are ourselves seeking a market.

More than three-fourths of the cotton utilized by the manufacturers of Europe is produced in the United States and sold in the raw state to those manufacturers. Practically all of the copper which they import in the first stage of manufacture only is produced in the United States. Our sales of raw cotton to Europe in 1904 aggregated in round terms $370,000,000, while our total exports of cotton manufactures to all parts of the world aggregated but $22,000,000, or a little more than 6 per cent of the value of the raw cotton sent to the European countries, which are proving our chief rivals in supplying cotton manufactures in those sections in which we are trying to establish markets. The total value of cotton manufactures imported into Asia, Oceania, South America and Africa aggregated in 1903 over $350,000,000 in value, and of this the principal cotton producing country in the world—the United States — supplied but $22,403,713 worth, or approximately 6.4 per cent of the total, while the countries which buy their raw cotton from us supplied the remainder.

But there are other methods by which we may determine in some degree at least, the relative share which we have in supplying the manufactures imported by some of the more important countries in those sections of the world in which we have a right to feel that we should be at least one of the principal purveyors of manufactured goods imported. In South America we naturally feel that we should have a large part in supplying the articles imported. Not only are the people of South America our neighbors and our market somewhat nearer to their doors than that of the other great manufacturing nations, but we are their principal customers for the articles which they have to sell, and we should therefore be the principal market in which they buy the articles which they must purchase. While it is true that the sailing distance between New York and the ports of southern and western South America differs but little from that between the ports of northern Europe and those of southern and western South America, the fact that a large proportion of the exports from those countries are sent direct to our ports suggests that the vessels bringing this merchandise should carry back with them our own products and thus supply a much larger share of the imports of those countries than at present. Our total imports from South America amounted in 1904 to $120,000,000 and our exports to them but $51,000,000. Not only is this true, but our imports from South America have increased more than $54,000,000 since 1886, while our exports to South America have increased but $24,500,000 in the same time. In the year 1904, which showed larger exports from the United States to South America than in any preceding year, the total was but $50,750,000, while the latest available data regarding the total imports of South America as a whole puts the grand total of its imports at $375,000,000, indicating that in the best year of our export trade with that section of the world we supplied but about 13 per cent of its imports.

From what parts of the world does South America draw the remainder of this vast total of its imports? Chiefly from Europe. The figures of trade of South American countries in the latest available year show that they imported from the United kingdom $120,000,000 worth of merchandise chiefly manufactures; from Germany, $54,000,000, from France $35,000,000, from Italy $24,000,000 and from Spain $8,000,000, while, as already indicated, our own records for the past year of our exports to that part of the world totaled but $51,000,000. Thus, it is apparent that our European rivals are supplying the great bulk of the articles imported into the ports of our neighbors at the south, although we are not only large purchasers of their products, but increasing rapidly our purchases from them. From Brazil, our imports in 1904 amounted to over $76,000,000, while our exports to that country amounted to but $11,000,000. From Chile our imports in 1904 were over $10,750,000 and our exports to that country less than $5,000,000. From Colombia our imports were about $8,000,000 and our exports to that country $4,750,000. From Venezuela our imports were nearly $7,000,000; our exports but a trifle over $3,000,000. Only in Argentina and Paraguay do our exports find sufficient market to make their total equal or exceed our imports from those countries, while our grand total of purchases from South America in 1904 was, as I have already indicated, $120,000,000 and our sales to South America $50,750,000, stated in round terms. Meantime, the United kingdom sold to South America $120,000,000 worth of merchandise or more than twice as much as the United States, Germany $54,000,000 or about the same as the United States, France $35,000,000, Italy $24,000,000, and Spain about $8,000,000. A large part of this merchandise sold by our European competitors to South America was manufactured from raw material purchased in this country, shipped to Europe, there manufactured, and again shipped to the markets of South America.

Let us take a closer view of the more important articles imported into South America and compare the value supplied by other countries with that supplied by the United States. In cotton manufactures, of which Europe draws its chief supply of raw material from us, the United kingdom sold to South America in 1903 $38,000,000 worth, Germany $9,000,000, Italy $7,000,000, France $3,333,333, United States $3,666,666, Switzerland $1,000,000. Thus, of the $62,000,000 worth of cotton manufactures sold to South America by the seven principal exporters of cotton manufactures, the United States supplied but $3,666,666 worth, or less than 6 per cent of the total—yet we are the world's chief producer of cotton, and our ports contiguous to the cotton fields are nearer to South America than those of the great manufacturing countries of Europe. Take iron and steel as another example, the exports of iron and steel manufactures to South America in 1903 were, from the United kingdom, $18,750,000; from Germany, $13,000,000, and from the United States, the world's greatest producer of iron and steel, only $9,250,000. Of leather, France sent to South America in 1903 over $2,000,000 in value; Germany $1,500,000, and the United kingdom, $873,000 worth.

Now, let us turn for a moment to the other parts of the world, which are customers of the class of manufactures produced in the United States for which we are seeking markets. To China in 1903 our exports of cotton manufactures amounted to but $4,139,000, those of the United kingdom, which purchases her cotton chiefly from us, amounted to $22,829,000. True, 1903 was a bad year for cotton exports to China, but presumably the same causes which operated against our exports of cotton manufactures to that country would operate against the United kingdom, yet it still sold to China in that year cotton manufactures valued at five and one-half times as much as those sold to her by the manufacturers of the United States. In British Australasia, the imports of merchandise of all kinds from the United kingdom in 1903 were $133,000,000, and from the United States $38,000,000, and in South Africa in 1903 the imports from the United kingdom were $148,000,000, against $30,000,000 from the United States.

Yet there is a brighter side to the picture. Our exports to most of those countries are now gaining rapidly, and in many cases are gaining much more rapidly than those of our European rivals. Into Australia, for example, the imports from the United kingdom grew from $106,000,000 in 1893 to $133,000,000 in 1903, an increase of a little more than 25 per cent, while those from the United States grew from $7,500,000 to $38,000,000, an increase of about 400 per cent. Into South Africa the imports of the United kingdom grew from $54,000,000 in 1893 to $148,000,000 in 1903, an increase of 175 per cent, while those from the United States into South Africa grew from a little less than $3,000,000 in 1893 to over $30,000,000 in 1903, an increase of over 900 per cent. Into China the imports from the United kingdom increased from $30,000,000 in 1890 to $36,000,000 in 1902, and from the United States they increased from $4,500,000 in 1890 to practically $19,000,000 in 1900. Japan's imports from the United kingdom grew from $23,000,000 value in 1890 to $25,000,000 in 1902, an increase of but $2,000,000; from Germany they increased from $6,000,000 in 1890 to a little less than $13,000,000 in 1902, an increase of a little less than $7,000,000, while from the United States they increased from $6,000,000 in 1890 to $24,250,000 in 1902, an increase of over $18,000,000, or about two and one-half times as much as the increase from the United kingdom and Germany combined. Into Argentina, imports from the United kingdom fell from $55,000,000 in 1890 to $35,750,000 in 1902, a reduction of practically $20,000,000. The imports from Germany grew from $11,750,000 in 1890 to $12,750,000 in 1902, an increase of about $1,000,000, while from the United States the imports grew from a little less than $9,000,000 in 1890 to nearly $13,000,000 in 1902, an increase of nearly 50 per cent in our case, while in the case of Germany the increase was less than 10 per cent, and in the case of the United Kingdom the decrease was nearly 40 per cent.

Now what are the causes of the slow progress which we are making in capturing or attempting to capture the markets of the world for manufactures? This can, it seems to me, be readily answered. First, our manufacturers have up to this time made little serious effort to extend their markets abroad. True, our exports of manufactures have grown very rapidly in recent years, so much so as to attract wide attention, the total value of manufactures exported having increased from $184,000,000 in 1894 to $452,000,000 in the fiscal year 1904, and over $500,000,000 in the calendar year 1904. Yet, this increase has been with comparatively little effort on the part of our manufacturers, and occurs largely in the classes of goods which readily sell themselves; such, for instance, as copper, mineral oils, or manufactures of iron and steel, of which we are the world's largest producer. True, there has been a healthy growth in many other articles, and a growth due doubtless in some degree to the efforts of our manufacturers, but these efforts have not been, up to this time, at all in proportion to those put forth by our competitors in other countries. And this brings me to the second reason for the slow growth in our exports of manufactures and the small total which we are supplying in the markets of Asia and Oceania, South America and Africa, in comparison with our rivals of Europe. This second cause of slow growth is found in the fact that our European competitors produce and pack their manufactures in form and conditions suited to the markets which they are intended to supply. This is notably the case with Germany, whose exports of manufactures, especially to South America, are gaining very rapidly, and, indeed, making more rapid gains than those of any other country. The reports of our own consuls and others who have made careful studies of the condition in South America, Asia and Oceania, and other parts of the world in which we are attempting to find markets, indicate that the manufacturers who are making the most rapid headway in supplying the markets of those countries accomplish this result by manufacturing their goods to suit the markets in which they are to be sold, and packing them in form convenient for handling in those markets. As is well known, a large proportion of the manufactures entering the markets of South America, Asia and Oceania, and Africa, must be carried to the interior upon the backs of animals or men, and they must therefore be packed in form suitable for such transportation. In addition to this, the tastes and the customs have been so long followed that the buyers decline to purchase articles manufactured in other form though equally good and perhaps better. It is the recognition of this condition which is enabling other countries to hold the markets of Asia, Oceania, South America and Africa for many classes of manufactured goods. While it is true that the manufacturers of the United States have at home a large market, and that they have not, up to this time, deemed it advantageous to change the form of manufacture for their surplus in order to aid its entrance into foreign countries, the further fact that our growth in manufactures is far exceeding the growth of population suggests that the time is at hand when our producers of this class of merchandise can afford to manufacture a certain proportion of their goods in form required by the markets which they desire to invade, and into which they can only make a satisfactory entrance by offering their goods in the form to which the producers in that market are accustomed.

Still another difficulty which our manufacturers and others engaged in commerce with Asia, Oceania, South America, and Africa are constantly compelled to encounter is the lack of financial institutions and machinery through which their business transactions can be conducted. In all of those sections in which European countries are holding for themselves the bulk of the market for manufactures, banks and banking facilities, not only for exchange but for the establishment of reasonable systems of credit are entirely in the hands of Europeans, and there is a lamentable absence of organizations of this kind having a direct and satisfactory relation with financial institutions of the United States. The commerce of these countries, especially in South America, requires long credit during financial relationship with the country from which the merchandise is imported, and without systems of this character the manufacturers of the United States will continue to encounter great difficulty in attempting to establish satisfactory trade relations with the people of the countries in question.

Still another difficulty which our manufacturers must expect to overcome if they desire success in other parts of the world is the necessity of offering their merchandise through persons familiar with the language of the country in which it is offered, and the presentation of their printed and written communications in the language of those countries.

One other difficulty in our attempt to establish trade in the Orient, or in South America and Africa, and one which must be overcome at least in some degree, is the lack of direct and satisfactory shipping facilities. While it is a fact that the world is well supplied with ships and that our general export trade has grown rapidly in the face of the absence of an American merchant marine, it is also a fact that persons desiring to establish trade in manufactures, especially in Asia, Africa and South America, have found that their efforts were seriously handicapped by the lack of regular and reliable facilities for shipping their goods to the countries from which their orders came. The testimony taken before the merchant marine commission during its long visit to the great manufacturing and exporting centers of the country in the summer of 1904, showed clearly not only a general demand among manufacturers and exporters for encouragement to American shipping, but that would-be exporters found a great and insurmountable difficulty in the fact that they are unable to meet their orders with a promptness and reliability on account of the absence of steamship lines which would leave our ports at regular intervals and at fixed dates for the ports of the countries from which the orders are received. These reliable and regular opportunities for shipments of merchandise cannot be had, it is believed, without steamship lines which are required by their agreement with the home government to leave the ports promptly at the dates fixed for their departure and arrival at the ports of destination at fixed dates. With these facilities the manufacturers of the United States may make their contracts for delivery of their merchandise for Asia, Oceania, South America and Africa and fulfill those engagements in a businesslike and satisfactory manner; without them, the experience of those who testified before the merchant marine commission indicates that orders cannot be satisfactorily filled and that an expansion of our trade in manufactures will continue to be extremely difficult.

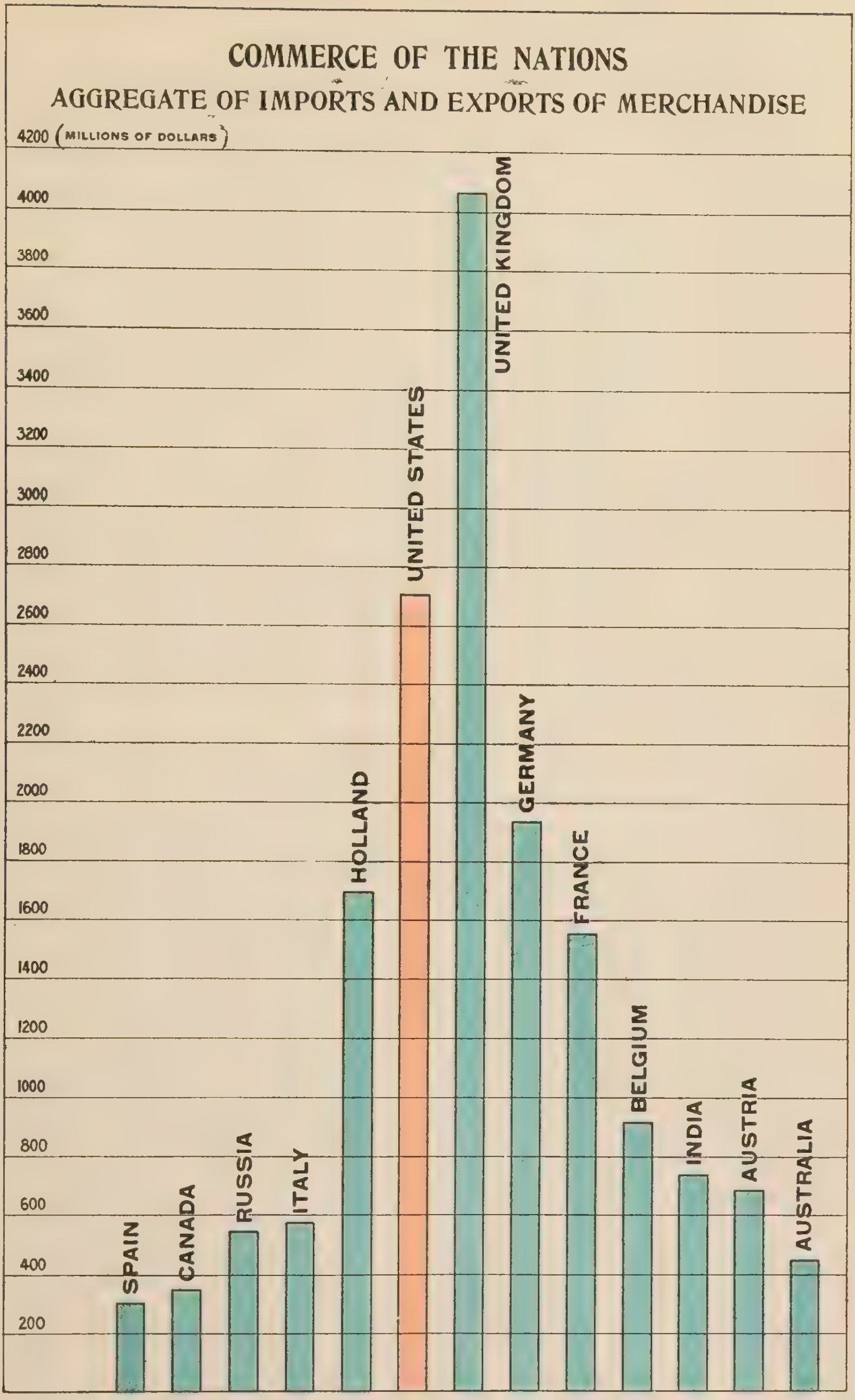
Our export trade for 1904 amounted to $1,460,827,271, and yet, strange to say, less than 8 per cent of this trade was carried in American bottoms. With American lines of steamers running at stated intervals from American ports, there is no reason why we should not capture the trade of Central and South America. We have unlimited capital, mechanical ingenuity and inventive genius second to none, the most improved machinery, skilled mechanics and wideawake, go-ahead, enterprising business men, and above all, we have the raw material. The advantages are all on our side, and if we only go to work in the right way and in the right field we can win the race for commercial supremacy and drive our rivals from the field.

It is true that we have a great foreign trade, but that trade is not entirely the result of intelligent and well directed effort on our part. Foreign nations buy the produce of our soil because they need those products, and the same is practically true of most of our manufactures.

We produce more than three-quarters of the world's supply of raw cotton, and yet our exports of cotton manufactures amounted last year to the paltry sum of $22,000,000, a decrease from 1903 of over $10,000,000. The value of cotton manufactures imported by South America in 1903 was in round numbers $63,000,000, and of this amount the United States only controlled about $3,700,000 worth. Great

Britain in 1903 exported to Argentina cotton manufactures of the value of $11,611,400, while the United States during the same period exported to Argentina cotton manufactures of the value of only $285,456. There is no reasonable excuse for this condition of affairs. England does not produce a single pound of raw cotton. We, on the other hand, are the world's greatest producer of raw cotton, and yet England is to-day the world's greatest manufacturer of cotton goods. She buys practically 3,000,000 bales of cotton annually from the United States and ships this cotton to her mills where it is converted by English labor into cotton yarns and cloth and then, after supplying her home markets, she exports manufactured cottons of the value of $360,000,000. In other words, out of raw cotton bought mostly in the United States, after supplying her home market and her own people England sells to the markets of the world cotton manufactures to a value greater than that of the entire product of all the American mills put together.

There is something radically wrong with this condition of affairs. The south above all things is vitally interested in the cotton industry. Cotton is its staple product. It is one of the great sources of its wealth, and its production and manufacture should be encouraged and safeguarded in every possible way. Men of the south realize the necessity for the establishment of new factories in the south and the finding of ready and profitable markets for the products of those factories. Some of these markets are near at hand, Cuba purchases between $6,000,000 and $7,000,000 of cotton goods a year, and the United States, with a preferential in her favor supplies Cuba less than 10 per cent. The Philippine islands, American territory, during the past five fiscal years purchased over $33,000,000 worth of manufactured cotton goods, and our share of this was only $1,003,842 worth, or less than 3 per cent of the whole. There is no reason why Cuba, lying at our very threshold, should not purchase her cotton goods and other supplies from us. There is no reason why the Philippine islands, an American possession, should not purchase from us. There is no reason why South and Central America should not purchase practically all their supplies



COMMERCE OF THE NATIONS

AGGREGATE OF IMPORTS AND EXPORTS OF MERCHANDISE

from us. And, above all, there is no reason why the United States, the world's great producer of raw cotton, should import annually $50,000,000 worth of cotton goods manufactured mostly from American cotton and then pay a duty on those goods when they enter the United States.

These markets of right belong to us and in time we are bound to have them, but we must go after them, we must seek them, we must cater to them, and we must meet their special requirements the same as we meet those of the home market. And when this is done we can multiply our mills and spindles by four or eight and keep them all busy. England to-day cannot fill her orders. Some thirty or thirty-five new mills are now in process of construction in Lancashire. We control the trade of South America when it comes to the sale of agricultural implements, breadstuffs and manufactures of wool, but Great Britain and Germany distance us when it comes to the sale of manufactured iron and steel. I might go on citing instances and making comparisons, but I think I have said enough to demonstrate the necessity of organization and concerted action if we expect to increase our foreign trade.

The Pacific ocean covers about one-third of the earth's surface. Half the population of the world is on the Pacific ocean, and when the Panama canal is completed it will bring us into closer touch with the peoples of the Pacific and afford us ready markets for our manufactures and the products of our soil; it will give us the trade of South and Central America and a goodly portion of the trade of the Orient, but we want that trade now. We need it and there is no reason why we should not have it. It will not, however, come to us unsought and unsolicited—that is not the law of trade, not even of domestic trade in these days. Markets belong to those who get them. The battle of trade to-day is to the strong, the swift, the alert and the intelligent. Trade plums do not drop into the mouths of those lying under the trees, but to those who shake the trees. Until very recent years our domestic market has sufficed for the absorption of our domestic production—that condition, however, no longer obtains. We can produce more than we can consume and new markets must be sought and developed, and those markets are to be found in Mexico, Central and South America, and the West Indies. The trade balance of that area is heavily against us; we buy from it more than we sell to it; our exports to it last year were $162,000,000; our imports from it were $287,000,000. Now, this balance, at least, should be paid in merchandise and the opportunity lies open for sales which could far more than equalize the account. There remains the question of how this may be done; how this trade may be secured. The most important factor in that problem lies undoubtedly in broad and accurate knowledge of local trade conditions; in knowledge of the special requirements of each country; in knowledge of transportation facilities, banking facilities, the system of credits, and the nature and character of the goods required in each and every different country.

To assist the merchants and manufacturers of the country in obtaining the information needed in these various trade branches the department of commerce and labor was organized. Congress at the last session appropriated the sum of $30,000 to enable the department to send special agents abroad to study and report upon trade conditions, but the department will be powerless unless it has the active cooperation of the manufacturers and exporters of the country.

If it is necessary to have a merchant marine in order to secure the foreign trade, then fight for an American merchant marine. If it is necessary to have branch American banks established in foreign countries in order to secure the foreign trade, then fight for the establishment of those banks. If it is necessary to have full and complete information as to the wants of the people, the kind of goods they need and use, and the manner in which the goods ought to be packed, then send agents abroad and get that information. Find out what business rivals are doing, what inducements they are offering to secure the foreign trade, then see them, and, if necessary, go them one better. Foreign competitors are sending their agents to every part of the globe, one agent at times representing as many as fifteen or twenty different lines of manufactures. They are establishing branch houses and are gaining a strong foothold in the territory that by all the laws of trade belongs to us. The United States can displace them, however, and secure these markets for use if it does not delay too long. The time is ripe for American invasion of foreign markets, especially the markets of the Pacific, and it will be our own fault if we do not at once start an aggressive and determined campaign for the purpose of securing those markets. The value of our manufactures for the year 1905 reached the magnificent sum of $15,000,000,000, an increase over the census of 1900 of $2,000,000,000, and there is every reason to believe that the ratio of increase will continue during the next five years. But there is still room for improvement, still room for further development, and I confidently look forward to the time when we will manufacture at home every pound of raw cotton raised in the southern states, as also many of the articles we now import. The department of commerce and labor stands for the development of our foreign and domestic trade; it stands for the great manufacturing and commercial interests of this country; it stands for the labor interests, and the shipping interests, and its duty is to foster, promote and develop those interests as also the transportation facilities of the United States. The department will become a giant and a most powerful factor in the upbuilding and promotion of American commerce and the elevation of American labor.

NATURAL RESOURCES OF THE UNITED STATES.

BY CYRUS C. ADAMS.

[Cyrus Cornelius Adams, editor on the staff of the New York Sun, born Jan. 7, 1849, at Naperville, Ill.; was graduated from the University of Chicago in 1876, became a lecturer on geological topics, and associate editor of the American Geographical society; he was the first president of the department of geography in the Brooklyn Institute of arts and sciences; made its geological collection in 1889–90, which included 2,500 items illustrating appliances for geographical educational purposes from ten countries; he is the author of Commerical Geography for High Schools, Elementary Commercial Geography, David Livingston, African Development for Beacon Lights of History, and contributes to magazines on geographical topics.]

Many foreigners who cross our country are impressed by two facts: its vast extent and its very apparent sparsity of population away from a few great centers. We are among the most populous nations in the world, but our domain south of Canada is so great that with all our 80,000,000 people we have an average density of population of only about twenty-eight to the square mile, in which respect we are comparable with Norway, one of the most thinly peopled countries of Europe. That part of Great Britain occupied by England is one of the most densely peopled regions in the world; but if England had only our density of population its inhabitants would number less than one-fourth the number in Greater London.

We have really no conception derived from our experience at home of what great density of population means. Perhaps the following facts may give a vivid idea of it. If we were to crowd our 80,000,000 people into Texas and add to them 40,000,000 more we should have a density of population in that state comparable with that of the lower Yangtse valley and the great eastern plain of China between the Yangtse and the Hoang rivers. But human experience has recently recorded a still greater density of population than this, and the following is deduced from the recent census by the Chinese government and already accepted by statisticians as a fair approximation of the number of persons in China. If we were to place in Texas double the population of the United States, or, say, 150,000,000 persons, we should have in that state approximately the density of population that is to be found in the Shantung province. Our nation may never be called upon to confront the problems growing out of such a prodigious congestion of humanity as this; and these illustrations of great density of population are given here only to show one aspect of our enormous territory. China is not half so large as our country and its natural resources, area for area, are no greater than our own; so the 408,000,000 souls in China proper at least give emphasis to the thought that we have as yet scarcely began to scratch the surface of the capacity of this country to support many times its present number of inhabitants.

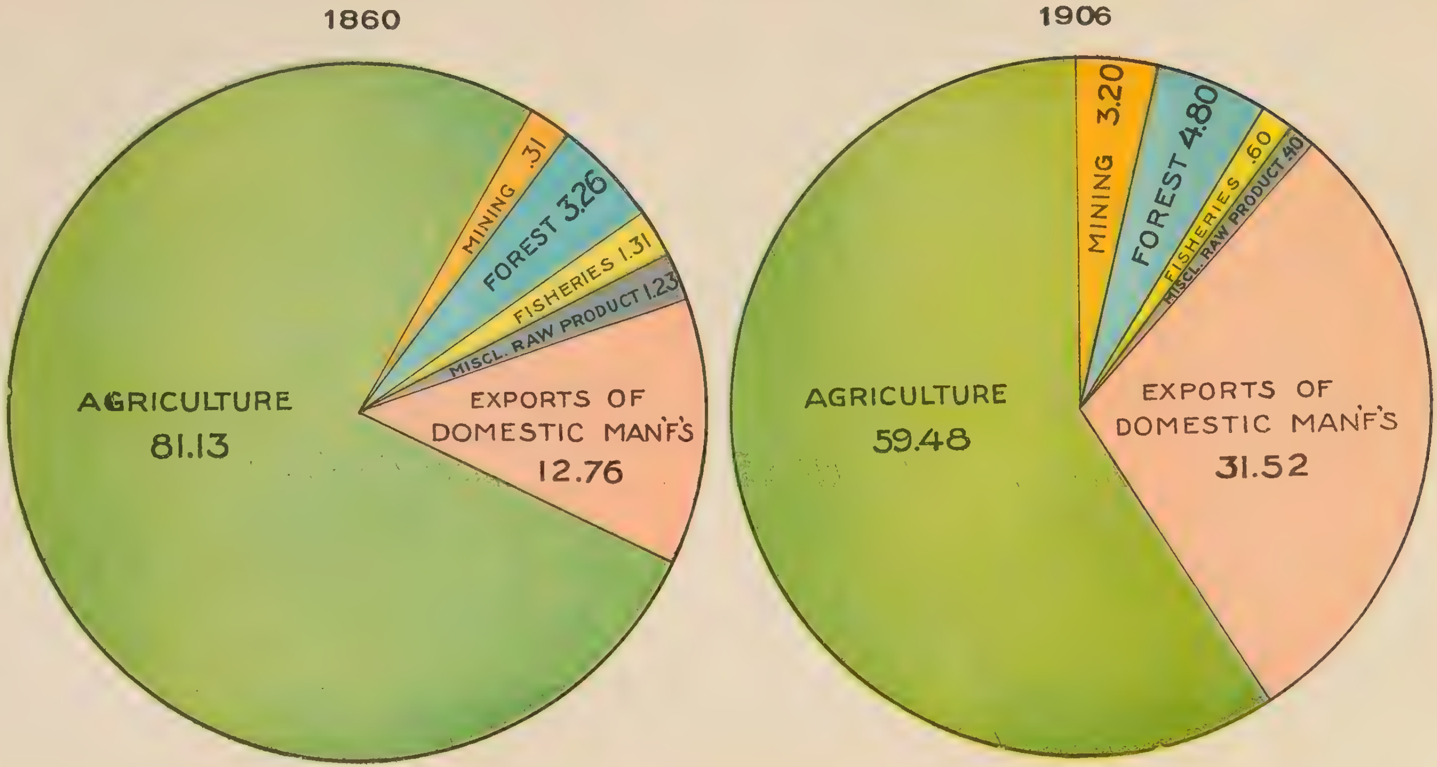
Another influence of our vast area is permanent, far-reaching and most significant. The United States extending from ocean to ocean reaching far into the north and far into the south, with vast areas only 1,000 feet or less above the sea and others of high altitude, has great variety of climatic conditions and therefore great diversity of products; so that we grow nearly all the commodities of the temperate and subtropical zones, and not a few products of the tropical zone. We raise the citrus fruits of the Mediterranean, the figs of Smyrna and the dates of the Persian Gulf. We find that we can grow the famous Sumatra tobacco which we still import to the amount of millions of dollars every year; that we can produce Egyptian cotton, and Egypt does not raise all that the world would like to consume of that unique and superior fibre. This diversity of products and our large mineral resources make the country practically self-sufficient. No nation can become self-sufficient unless it reaches across a continent and embraces a wide latitude like the Russian empire, Australia and the United States. We really need to import very little except certain raw materials from the tropics which our own colonial possessions may some day supply.

We may properly treat not only the vast extent of our country, but also its situation with respect to other nations as among the geographic elements that have helped our material development. It is to our advantage that we are on the same side of the tropics with the nations that are the greatest buyers of the bread and meat stuffs and other commodities we have to sell. It is a great disadvantage to be compelled to carry perishable commodities across the tropics. India raises large quantities of wheat and Europe would have been glad, many years ago, to buy Indian wheat; but before the Suez Canal was built India could not export this breadstuff to Europe. Steamers could not carry the wheat because, to double the south end of Africa, they had to recoal at St. Helena or Cape Town, and coal was very dear, for it was brought from Europe 5,000 or 6,000 miles away; the cost of the trip was very high and wheat being a cheap and heavy commodity can never be transported far at high freight rates. Wheat often sells for sixty cents a bushel in Chicago, and unless rates are cheap it cannot be moved. Neither could sailing vessels carry the Indian crop because they moved slowly through the hot latitudes both of the Indian and Atlantic oceans, and by the time the long journey was over the deterioration of the grain rendered it almost unsuitable for flour. But when the Suez Canal was opened India could send her wheat to Europe by steam and the problem was solved.

Before the days of refrigeration meat could not be sent to markets across the tropics; but even with refrigeration it is a great disadvantage to be compelled to freeze meats solidly in order to insure their good condition upon reaching the consumer. There is much prejudice against frozen meats in some parts of Europe, particularly in Germany, but consumers there are willing to buy enormous quantities of our chilled meats, which, they assert, are superior in quality to the frozen article. We are not compelled to freeze our meats to send them to Europe but the consignments are placed on steamships in chilled rooms whose low but not freezing temperature keeps them in good condition. When we remember that our foreign meat trade is a very important element in our commerce we can realize the inestimable advantage of not being compelled to carry this commodity across the tropics.

The United States, as well as all the other greatest commercial nations, fronts on the Atlantic making that ocean the

PERCENTAGE OF EXPORTS OF UNITED STATES BY SOURCES OF PRODUCTION



pre-eminent highway of sea trade. A few years ago, a patient and laborious German set himself the task of ascertaining approximately the amount of business activity on the Atlantic. After collecting many facts he reached the conclusion that there are always afloat on that ocean about 50,000 vessels of one sort or another and that its floating population is constantly about 300,000 human beings. The value of the Atlantic for sea trade is increased by the fact that most of the great navigable rivers belong to the Atlantic drainage basin. All the great rivers of Europe, except the Volga, of Africa, except the Zambesi, and of America south of Alaska are tributary to the Atlantic. The Yangtse of China is the only river of the first class and of great commercial importance that is tributary to the Pacific. The Indian Ocean finds feeders for its trade in the Menam, the Irawadi, the Ganges and the Indus; but the great rivers of northern Asia are frozen two-thirds of the year and empty into seas that are likely to be ice-choked at all seasons. We shall see a little later how wonderfully helpful are our rivers in contributing to our large share in the sea trade of the Atlantic.

We are blessed with an abundance of good natural harbors to serve our commerce on this highway. Most of the largest and best of them are exactly where they may best serve our trade—on our northeast coast fronting the greatest commercial nations of Europe, with whom we have the largest dealings. On the whole, our harbors are naturally better than those of Europe; the result is that though nearly all harbors require large expenditure to fit them for shipping and to make good the deterioration that is constantly in progress, our disbursements for these purposes are not nearly so great as they are in Europe. Since the coast and geodetic survey was organized New York bay has been resurveyed five times to indicate the positions of needed improvements. The work of deepening and extending the channels of New York harbor may cost from $7,000,000 to $8,000,000 before it is completed; but Liverpool harbor has cost, from first to last, over $200,000,000, more than half of which has been expended in the last forty-five years.

The great distinction between our leading seaports and those of Europe is that we have only to improve our natural harbors while the nations over the sea must make their great ports. Europe can show no ports like those of Puget sound and San Francisco which will admit the largest vessels without deepening the channel; and our other largest ports may attain the same degree of efficiency at a total cost that seems small in comparison with the vast sums spent at Liverpool alone. London, Newcastle and Cardiff, as seaports are largely artificial creations, the result of improvements made at enormous cost. The port of London extends from London bridge to the mouth of the Thames, but no vessel drawing more than 26 feet can ascend to London except at high tide; at other times large ships must stop at Tilbury docks, 35 miles down the river. Glasgow deepened and widened the little ditch of the Clyde till it was transformed into a ship-floating river. All the Baltic ports of Germany are more or less obstructed by ice in winter, nor do her great North sea ports always escape this inconvenience; for this reason Hamburg and Bremen require outports, and Bremen must have an outport all the time because the larger vessels cannot ascend to the city. We have no port like that of Valparaiso, Chile—a splendid harbor save for the vital defect that the entrance from the sea is so wide that storms invade it and endanger shipping. We have no need for such a splendid example of engineering art as the great breakwater at Cherbourg, which without this protection would be a dangerous roadstead. The North American seaboard shows no conspicuous example of the artificial harbor so common in other countries except at Vera Cruz which has just been turned by the labor of years into a good and commodious port.

Most of our Atlantic coast is low and presents all the prominent types of natural harbors. We know that large areas of the earth's surface are very slowly subjected to vertical movements, being uplifted above their former level or depressed beneath it; and that these movements are best observed along the margins of the sea. We speak, for example, of the uplifting of a part of the coast of Scandinavia, and of the sinking of the coast of New Jersey. In the course of the depression of the coast line the sea invades the valleys, widening and deepening them, and turning some of them into deep water harbors which are called drowned valley harbors. When the sea burst over the barrier at the Golden Gate it turned the valley on which San Francisco stands into one of the finest drowned valley harbors in the world. New York is another example of a drowned valley harbor, which, wherever found, are among the best natural harbors. We see another form of the drowned valley harbor in the fiords of the Maine coast, long, narrow and deep, with this disadvantage that, when their entrances are funnel-shaped, the incoming tide rises very rapidly and high so that the difference between mean high and low tide in some of our Maine ports is as much as twenty feet, which is an inconvenience to shipping. The difference between mean high and low tide at New York is only a little over four feet.

The barrier harbor is also well represented on our eastern seaboard; thus we may speak of Boston harbor as being protected from sea storms by the cluster of islands at its mouth; and of the numerous smaller ports of the south Atlantic coast as sheltered from the ocean by the sand reefs that extend brokenly along the front of our coast from Long Island to Florida.

River ports such as Philadelphia and New Orleans and ports at the head of deep embayments, as Baltimore, permit ocean vessels to penetrate a considerable distance into the land, which is an advantage because ocean freights are cheaper than those of the land routes. Baltimore, 140 miles from the sea, is nearer to the Mississippi valley than is New York.

Our Pacific coast, unlike our eastern seaboard, is high and rocky and has only four fine harbor centers, but they are so distributed as to serve adequately all the purposes of our Pacific trade. Puget sound, one of the most useful of inlets, has scores of miles of shoreline along which the water is so deep that docks might be built anywhere for the largest vessels. The fine river port of Portland supplements the Puget sound ports in the northern trade, San Francisco is the great central gateway of the Pacific commerce and San Diego, at the extreme southwestern corner of the country, with a land-locked harbor in which the government has been making great improvements, is nearest to the cotton fields and is becoming important in the shipment of raw cotton and cotton fabrics for the Oriental market.

When a steamship leaves Seattle in summer the crowded decks and docks resemble the busy and inspiring scene upon the departure of an Atlantic liner at New York. The fact that most of those passengers are not going to seek gold should convince us that it is time to count scenery among the important assets of the country. Every year increasing crowds are drawn to Alaska by the mighty glaciers, the rugged fiords, the snow mountains and the splendid, bracing air in that part of our domain. Among our western mountains men are now building hotels, making roads, cutting paths and procuring guides, so that scenery may be enjoyed to the best advantage and under comfortable circumstances. Our scenery, from the White mountains to the Pacific coast ranges, may be included among our resources, as substantial a source of gain as the Alps of Switzerland which bring into that country millions of dollars every year.

The United States, in the main, is a great central plain bordered on the east by mountains of no great elevation, and on the west by plateaus and mountains of high elevation; with narrow eastern and broad southern coastal plains; with most of the rivers that are important in an economic sense confined to the eastern half of the country; and with inland seas providing the cheapest transportation known excepting on the oceans. All these topographic features have had a profound influence in distributing our industries and shaping our development.

Probably no other coastal plain has so advantageous a position and so many elements that conduce to prosperity as the plain along our Atlantic seaboard. The waste brought down from the mountains on the west has contributed to its fertility and make it a meridional zone of fruits and vegetables, cereals and hay. At its western edge are the clays used in the development of the largest pottery industries of the country. Nearer the sea is the long sandy zone which, south of Virginia, supplies large quantities of lumber and naval stores;

and on the sea edge are the swamps which, when reclaimed, are extremely fertile. Where the softer plain joins the harder rocks of the Appalachian belt the rivers crossing from the harder to the more yielding rocks have made a line of waterfalls beside which many thriving towns and cities have been reared to use this power in manufacturing; and along these narrow belts of manifold resources and industries extend railroads easily built because they met few natural obstructions and leading straight to the great cities of the north that are the pre-eminent markets for most of these commodities.

The broader southern plain along the gulf is a great region of the lumber industry with a product of nearly $2,000,000 a year, of agriculture and chiefly of cotton raising, for this is a part of the great cotton belt. The plain merges with the Mississippi valley which from our northern border to the gulf is the pre-eminent agricultural zone of the country, the northern part of it, mantled with the fertile rock mixtures of the glacial drift, the richest area of wheat and maize in the world; the southern part, included in the cotton belt, which supplies nearly three-fourths of the world's cotton; and in the border lands between them a zone of tobacco cultivation, our largest area devoted to this crop.

West of the great valley the plains begin to rise midway between the two oceans. It is to be observed that the main axes of all our predominant topographic features extend north and south excepting the great lakes whose main axis is east and west. The plains extending from Canada to Mexico and gradually rising to the western plateaus are the largest field of the grazing industry which has long supplied most of our export beef though not our export cattle, the greater number of which are fattened in the corn belt. The plains have been much impaired by overgrazing and must be nursed back to their former productivity. Just as the nibbling sheep have destroyed all verdure on the mountains of Greece, so they have been very effective in killing out much of the nutritious bunch and other grasses on the plains and among the mountain pastures farther west. The plains gradually rise till they merge with the great plateaus which embrace about a third of the country and with their surmounting mountains extend nearly to the Pacific. They are the largest sources of our precious metals in whose production we have for many years usually surpassed other nations.

We must count mountains as among our greatest blessings. While our valleys and plains are the sources of most of the food for man and beast, it is from the mountains that we derive a very large part of our metals and other minerals. If we had a great mountain wall stretching from east to west we might be shielded from the Arctic blasts that sweep down from the plains of Canada in winter and chill us to the bone. We know that northern India is thus protected by the Himalayas and northern Italy by the Alps, so that the average winter temperature on the French and Italian Riviera is warmer than at Rome. It is questionable, however, whether such a climatic barrier would be of any advantage to us as a people, for our diversity of climate tends to intensify stamina and energy. Our mountains are the largest sources of water power which is more valuable than ever now that elecrticity is used for the transmission of power. They add largely to our timber resources and though of little use for agriculture they provide a large amount of fine grazing land. Their rock waste is spread over the surrounding plains to their enrichment and they husband our water resources where they are most needed. It is among the mountains that reservoirs are to be built to conserve water from the melting snows and glaciers and advantageously distribute it over the regions to be irrigated which, it is estimated, may reclaim 50,000,000 acres to fertility.

Our mountains are partly responsible for the prevailing aridity of the plateau region, for though the Pacific coast from Puget sound to a little south of San Francisco has abundant precipitation the rain clouds are wrung nearly dry among the mountains so that there is little moisture left to distribute over the plains east of them; but nearly half of our Pacific coast to the south of San Francisco is in the zone of the northeast trade winds which girdle the world in the northern hemisphere, blowing most of the time as dry winds off the land instead of coming to the land as moist winds from the sea; so that even if there were no high mountains in the southern part of California the adjacent country would derive little rain from the Pacific. We are indebted to these southwestern cordilleras for the fact that the rainfall they conserve may be led down to the California valleys turning them into areas of wonderful fertility, the great centers of our home production of semi-tropical and some other fruits. We remember the time when the "Great American Desert" was spread over most of the western part of our maps. It has now shrunk to very small proportions indeed; and the drier regions of the country will some day be eliminated as far as water can be obtained for their reclamation.

At least twenty inches of rainfall a year are required to make farming fairly profitable, and this is a scanty supply. Nearly double that quantity falls in the half of the country lying east of the 100th meridian and along the northern three-fifths of the Pacific coast, and to these regions is confined nearly our entire developments of agriculture excepting where stock is fed on the plains or crops are irrigated. The profound influence which this unequal distribution of rainfall has had upon our lordship over the domain committed to us is shown on many maps. A map showing our density of population usually leaves white most of the vast region west of the 100th parallel; a map showing the distribution of our swine industry shows its western frontier in central Nebraska, Kansas, and Texas because we fatten hogs on maize which requires abundant moisture; a map illustrating cattle industries shows the limit far to the west of the region of swine, for cattle can thrive on grasses of the plains, though we drive many of them into the corn belt to fatten. A map showing the larger phases of our manufacturing development practically coincides with those colors on a density of population map showing forty or more inhabitants to a square mile. Naturally we have not developed large manufacturing in areas that average a fewer number of persons. If we look at a map of our irrigation centers we may see to-day a large number of them scattered over the plateau region. But those dots represent only small areas of irrigated land. Perhaps we shall never see the irrigation centers largely increased in number, but many of the dots on the present maps will spread out into broad or long patches of color representing very important areas of reclaimed lands.

River valleys have always facilitated the advance of man into the interior of the continents, and for this reason the Nile, the Euphrates, the Ganges, and other great rivers are spoken of as the creators of history. Exploration is usually retarded wherever physical obstacles make it very difficult to ascend the rivers, such as the rapids of the Mekong and the Congo; the latter river was known less than 200 miles from its mouth until Stanley launched his boats on the upper river and floated down the stream. Our rivers also have been the creators of history. Just as the Jesuit Fathers paddled their canoes up the St. Lawrence and the Ottawa, carried them across portages to rivers leading to the Great Lakes, followed up the western tributaries of Lake Michigan and finally pushed their little craft into the current of the Mississippi, so our forefathers used the rivers and lakes to push their hamlets and their farm lands inland; and reaching out on both sides of the waterways they found new opportunities for settlement and enterprise. The old Dutch burghers lined the Hudson with their farms and villages. In the course of time the settlements spread farther and farther from the river edge. The pioneers, for example, pushed up on the great limestone plateau of the Catskills to see what they might find. They discovered fine forests of hemlock, and the day came when immigrants from Connecticut and other regions went to the Catskills for the primary purpose of using hemlock bark to turn into leather the hides produced by farmers. As the population of the valley steadily increased it was certain that a town would rise at the head of navigation on the Hudson; for wherever an important amount of transshipment of freight between land and water is made there must be freight handlers, blacksmith shops, living accommodations, and fodder and shelter for animals; a town is sure to rise at such a place and thus Albany and Troy were founded at the head of navigation.

The valley of the Mohawk was discovered opening an easy route of penetration to the west. The gradually growing stream of immigrants pushed westward clearing farms and founding settlements along the Mohawk; following up a little tributary of the river some of them made their way into the forests of Fulton county where, finding plenty of deer, they began to dress buckskin and make gloves for which they found a ready market. The farmers' wives and daughters took up the industry in increasing numbers, and finally skilled labor from Europe came over and taught better methods of glove-making; so the industry grew until to-day we have Gloversville and the towns around it, the greatest center of glove-making in the country.

Entering the Onondaga valley from the Mohawk the pioneers found the salt springs of Syracuse, long the largest source of salt in the country; Oswego on lake Ontario is one of the oldest settlements in New York because the early farmers found along the Oswego river a natural route of penetration from Syracuse to the lake. Farther west they came to the Genesee river which they followed scores of miles to the south, making its valley, for many years, the largest region of wheat in the country; so they pushed steadily westward opening farms and planting towns along the lakes and the rivers flowing into them.

The facts of nature pointed unmistakably to the appropriate sites for towns. As the pioneers floated down the Ohio they came to the great bend of the river where it changes its course from northwest to southwest. When settlement spread away from the river not all the freight floated down the stream was destined for places farther southwest. There were towns to the northwest to be supplied and transshipment of freight to land routes was necessary; at this place of transshipment the city of Cincinnati arose. Still farther down the Ohio the river was impeded by rapids making another transshipment of freight necessary, and this fact resulted in the city of Louisville.

If we were to trace the history of our entire material progress we should find that the waterways of the eastern half of the country have been the main factors in determining the lines of development. Those persons who were able to interpret the meaning of the natural facts presented for their study have reaped large rewards. A young farmer started from St. Paul one day on a little steamer that was to be pushed as far up the Minnesota river as possible. He was looking for some very desirable pre-emption claim on which to begin farming. When the steamer finally stuck in the mud he said to himself: "It is right here that I want my 160 acres." He filed his claim and farmed the land till he sold it about ten years later for $25,000 to be divided into lots for the town of St. Peter which was rising at the head of navigation.

No great country, however extensive its railroad facilities may be, can afford to neglect its water highways. Notwithstanding our river and harbor bills and our Mississippi commission, we know little as yet of the scientific development of waterways for commercial purposes as it is understood in all the countries of northwestern and north-central Europe where boats freighted on the Vistula in Russia may reach, through rivers and canals, all the leading ports of the Baltic and North seas. Increasing density of population and towns and cities more thickly scattered over our domain will impress us, as Europe has been impressed, with the absolute necessity of supplementing our railroads with the fullest possible development of our water routes.

In the past few years we have seen the Mississippi transforming New Orleans into one of the great wheat ports as well as the greatest cotton port of the world. We see the Ohio and the Mississippi carrying coal, iron, and lumber 2,000 miles at a cost very little in excess of ocean freights; and though the Erie canal, which provides the port of New York with a continuous waterway to Duluth is antiquated and inadequate, it has made the Hudson river, with its 18,000,000 tons of freight a year, the largest commerce carrier among the rivers of America; it was the leading factor in giving to New York a commercial movement nearly equal to that of London. We have witnessed the development of our marine on the Great Lakes where marvelously cheap freights have helped us to compete with the world in iron and steel goods, though we carry most of our iron ore nearly 1,000 miles to the coke and limestone required to smelt it.

A country as vast as ours and with as small a density of population could not so early have attained its present development if our enormous system of communications had not afforded the lowest land freight routes in the world. A good topographic map shows us that the topography of the country was very favorable for the building of the vast systems of railroads whose mileage, extending to the neighborhood of most of our farms, would stretch nearly from the earth to the moon. There are gateways through our mountain ranges so that none of them is a barrier to commerce. We have no obstacle like the Pyrenees which so completely walls France from Spain that the land traffic between them must be deflected from straight lines to circumvent the extreme ends of the mountains at the edge of the seas. The comparatively level surface of our plains and plateaus, the predominating easy gradients and the mountain passes have helped to cheapen railroad construction and transportation so that commodities may be cheaply moved. Argentina raises its export wheat within fifty miles of tidewater. We send our export wheat 1,000 miles to tidewater, but the price of freight has been so cheap that we are able to compete with any nation in the world in exporting this commodity.

What a reservoir for future harvests of breadstuffs is our hard wheat region of Minnesota and the Dakotas, a part of the central plain of North America that is twice as large as Great Britain and Ireland or as New York and New England together, and larger than the German empire. These three states are producing much more than one-half of the spring wheat of the country, and we know that their capacity for production may be more than doubled. The Canadian northwest is boasting that its younger wheat fields are yielding twice as much grain to the acre as our lands; England, with less favorable conditions for wheat culture than we enjoy, raises more than double the quantity of grain to the acre than we produce.

We may say of our entire agricultural interest that we shall double our production when we improve our methods. We cannot measure yet the potential benefits which our agricultural department and the agricultural schools will confer upon the nation by their persistent teaching of scientific methods of tillage. A man near the east of Long Island is demonstrating every year that the highest grade of farming gives the best profits. He spends money without stint for fertilizers; all his operations are kept to the highest point of efficiency and he is selling his crop of vegetables, the product of 80 acres, at an average figure of $20,000 a year. He is making as much money from the soil as he could from any other business with the same amount of capital.

The mistake is sometimes made of attributing to one factor more than its due share in bringing about the advanced stage of development we have reached. The attention of no American, however, needs to be called to the fact that in this nation of highly intelligent laborers, of inventive genius and of boundless energy and ambition, the geographic conditions that have so wonderfully helped us are only one of the all potent influences which have advanced us to the rank we occupy among the great nations.

EXPANSION OF AMERICAN COMMERCE.

BY O. P. AUSTIN.

[Oscar Phelps Austin, chief of the United States bureau of statistics, treasury department, United States; born in Illinois; a writer throughout his business life as reporter, editor, correspondent; author of Uncle Sam's Secrets, Uncle Sam's Soldiers, Colonial Systems of the World, Colonial Administration, Commercial China, Commercial Japan, Commercial India, Commercial Africa, Commercial Central and South America, Submarine Telegraphs of the World, Great Canals of the World and kindred works.]

330.973 L165m

The growth in the foreign commerce of the United States has been a subject of interest and surprise to the whole world. Even our own people, familiar as they are with the wonderful resources which have produced that growth, pause in astonishment in the midst of the absorbing occupations of this strenuous age, and read again and again the figures which mark the marvelous growth of our commerce, and especially that of more recent years. For it is in the later years of our history that the most wonderful growth has come—a growth which has exceeded the greatest expectations of the most enthusiastic believer in our possibilities of production and manufacture and power to capture the markets of the world.

The year 1870 seems to have marked the beginning of a new order of things in the producing power of the country. With the opening of the transcontinental railway in 1869, and the construction of lateral lines which rapidly followed, the great producing sections of the interior were rapidly developed, and the power not only of production but of bringing together the natural products for manufacture and transportation to the seaboard gave new life and activity to the United States as a producing, manufacturing, and exporting nation.

Prior to 1870 we had almost constantly imported more than we exported. From 1790 to 1870 the imports exceeded the exports by nearly $2,000,000,000. In 1874 the exports began to exceed the imports, and have so continued in an almost unbroken record, and the excess of exports over imports from 1870 to 1902 is over $5,000,000,000. From 1790

ST. JOHN'S COLLEGE
WINFIELD, KANSAS

to 1870 the exportations averaged $122,000,000 per annum; from 1870 to 1902 they averaged $833,000,000 per annum, and in the last two years the exports have aggregated more than in any full decade prior to 1870.

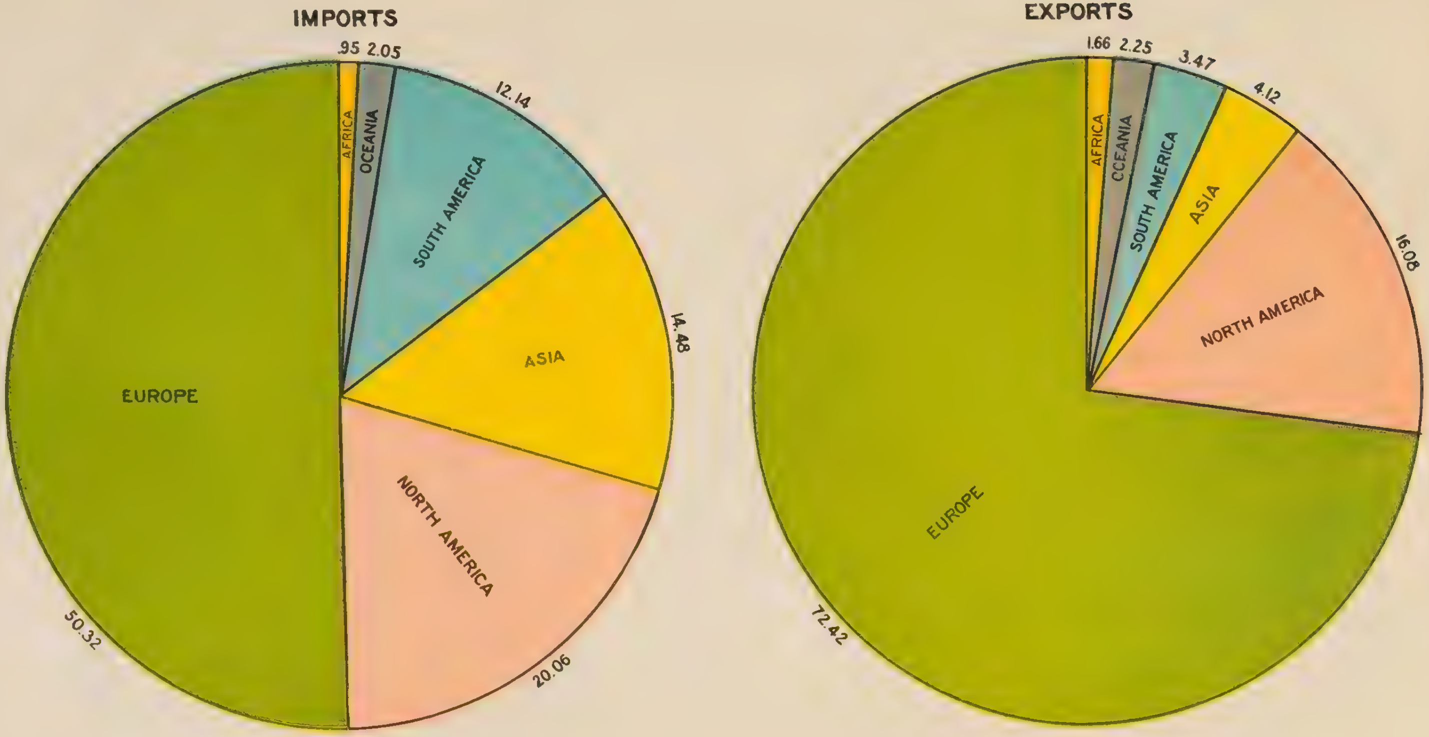
In the brief period since 1870 the production of corn has grown from 1,000,000,000 bushels to over 2,000,000,000 bushels per annum; of wheat, from 235,000,000 bushels to 535,000,000 bushels; of cotton, from about 3,000,000 bales to over 10,000,000 bales; the number of animals on farms, from 102,000,000 to 213,000,000, and the value of farm products, from $2,447,000,000 to $4,739,000,000. The production of petroleum increased from 220,000,000 gallons to 2,660,000,000 gallons; of coal, from 33,000,000 tons to 260,000,000 tons; of pig iron, from less than 2,000,000 tons to over 15,000,000 tons, and of steel, from less than 70,000 tons to over 13,000,000 tons. Meantime the railways of the country have grown from 52,000 miles to practically 200,000 miles and rail transportation rates from Chicago to New York have fallen from 33 cents per bushel of wheat to 10 cents per bushel, and on other freights there were also large reductions.

At the same time our mines of the precious metals have poured forth their treasures, and the money in circulation in the country has grown from $675,000,000 to $2,260,000,000, and from $17.50 per capita to $28.60 per capita. The effect of these conditions upon manufacturing has been phenomenal, electrifying.

Manufacturing has meantime grown even more rapidly than agriculture. The number of persons engaged in manufacturing has increased from 2,000,000 to over 5,500,000; their earnings, from $775,000,000 to $2,735,000,000; the capital employed, from a little over $2,000,000,000 to about $10,000,000,000, and the value of manufactures produced, from $4,250,000,000 to $13,000,000,000. And all this, let it be remembered, has happened in a short thirty years, while the population was only increasing 100 per cent.

What has been the effect upon our foreign commerce of all this enormous increase in production and manufacturing and the cheapening of the cost of production and transportation? The exports have increased from $9.77 per capita

PERCENTAGE OF IMPORTS AND EXPORTS BY COUNTRIES



to $18.81 per capita in the same period. The exportation of agricultural products has increased from $293,000,000 to $943,000,000, and that of manufactures from $55,000,000 to $412,000,000. Europe has increased her purchases of our products from $302,000,000 to $1,122,000,000; North America, from $43,000,000 to $185,000,000; South America, from $14,000,000 to $44,000,000; Asia and Oceania, from $6,500,000 to $84,000,000; and darkest Africa, from $1,000,000 to $25,000,000.

What has been the effect of these developments on our rank as an exporting nation? We have advanced from fourth place in the list of exporting nations to the head of the list. In 1870 England, Germany, and France exceeded the United States in their exports. To-day our exportation of domestic products exceeds that of any other nation in the world, and is advancing at a rate which gives assurance that we shall maintain this proud position as the world's greatest producer and exporter.

The causes of this wonderful development are not difficult to find. The principal requirements of man can be enumerated upon the fingers of one hand, viz.: Food, clothing, heat, light, and manufactures. Of all these the United States is the world's greatest producer.

The principal articles of food are breadstuffs and meats. For the breadstuffs we produce more wheat than any other country in the world, and more corn than all the other countries of the world combined. For meat, the chief supply is beef and pork, and of each of these we produce more than any other country in the world.

For clothing, the quantity of cotton required by the world far exceeds that of any other material of dress, and of this the United States produces not only more than any other country, but over three-fourths of the world's entire supply. For heating, the chief requirement is coal, and of this we now produce more than any other country and at a cost far below that in any other coal-producing section. For lighting, petroleum is now the world's chief reliance, and we produce more of this article fit for use in lighting than any other country.

Of manufactures the United States is the world's largest producer. The chief requirements of manufacturing are iron, steel, copper, lead, aluminum, cotton, leather, and wood; and of all these we are the world's largest producer. As a result the United States easily leads the world both in the quantity and value of the manufactures produced, while the fact that we have more of the materials at hand than any other country, coupled with our cheap coal and ingenious machinery, gives us a great advantage in the cost of production. The value of the manufactures of the United States is now nearly double that of the United Kingdom, and about equal to those of Germany, France, and Russia combined.

Thus in the five great requirements of man—food, clothing, heat, light, and manufactures—the United States is the world's largest producer of their component factors.

But there are certain other great requirements which also have an important relationship to commerce, and they can be counted on the fingers of the other hand. They are invention, communication, transportation, finance, and energy.

While our natural facilities are very great, it will be conceded that their value has been multiplied by the genius of the American inventor. It is to the American invention of the steam plow, the self binder, the steam thresher, the cotton gin, and numerous other devices for performing by machinery what was formerly accomplished by hand labor, that our agriculturists have brought themselves to the foremost place in the world in the chief productions of agriculture. It was the American inventor who gave to the world the telegraph and the telephone, by which business possibilities have been multiplied beyond comprehension, and in the thousands of less notable inventions which enter into the daily requirements of production and manufacture and transportation the genius of the American inventor has enormously increased and will continue to increase our producing capacity and in greater degree than in any other country. The number of patents issued in the United States alone since 1870 is one-half as great as the number issued in all the rest of the world during that period, and the benefit which the American inventor and the American patent office has been to our production and commerce is beyond calculation.

Power of communication is another factor of equal importance in the world's commerce. Man may produce more food and clothing and heat and light and manufactures than all the rest of the world put together, but without the means of communication with his fellow man his chances of disposing of his surplus are small. But in this power of intercommunication the United States leads the world. We have more miles of railway than all Europe put together, six times as many miles as any other country, and two-fifths of the mileage of the world. We have twice as many miles of telegraph as any other country of the world, and every city and factory of the country is within speaking distance of every continent and great trading center of the world. In the number of telephone messages sent the United States surpasses the total for all Europe combined. Of post offices we have twice as many as any other country in the world, and the number of pieces of mail handled in the United States is greater than in all of continental Europe. Of newspapers, those great vehicles of communication and information, we have twice as many as any other country and more than one-third those of the entire world.

In transportation, that next great factor in commerce, the United States easily leads the world. In river and lake transportation by steam vessels our facilities are far greater than those of any other country, and the value of our Great Lakes in the transportation of the great products of the country contiguous to them can scarcely be realized. In railway lines we have, as already indicated, two-fifths of the mileage of the entire world, and more than all Europe put together, while our freight rates have been steadily lowered until they are now about one-third those of 1870, and are lower than in any other country in the world. Add to this the magnificent system of water and rail transportation of the interior, the fact that we have more coast line and more harbors than any other country, and a great ocean on either side to carry our commerce to the waiting world, and the value of this great factor of transportation will be appreciated.

In finance, another extremely important factor in the development and maintenance of production and commerce, the United States also leads the world. We produce more of the money metals than any other nation. There have been years in which Australia and South Africa have slightly exceeded the United States in gold production, and other years in which Mexico has slightly surpassed us in the production of silver, but in the combined production of gold and silver no country equals the United States. As a result of this, and of our favorable balance of trade, the United States now has more gold and a greater total of money in circulation than any other country of the world. Experts also estimate that somewhat indefinite term "banking power" as being greater in the United States than in any other country, while their estimates of total national wealth also place the United States clearly at the head of the list of nations.

The next and final feature in our claim to special advantages in production and commerce is that of energy. This is a product not easily measured in figures or terms; but when it is remembered that the population of the United States is formed by a combination of selected energy from the whole world, we may lay claim to a greater average supply of that important factor than any other country. The energy and determination which prompted the early settlers of America to leave their firesides and friends in Europe, and undergo the hardships and dangers of establishing homes for themselves in the new world, surely mark them as above the average in the supply of this characteristic. This is also true of a large share of the 20,000,000 of people who have come from other countries during the past century to establish themselves in the United States. Not only have they made valuable citizens and aided in the wonderful development which I have just outlined, but their intermingled blood flows in the veins of a large share of the present population, and carries with it an energy which, when guarded and vitalized by the work of our magnificent educational system, must tell for the future prosperity of the country.

These statements of our superior advantages in the production, manufacture, and transportation of the chief articles which man requires the world over, are not presented in a boastful spirit. My sole purpose in outlining these wonderful conditions is to show the solid foundation upon which our foreign commerce rests, and the assurance which we have that we shall maintain the proud position to which we have attained, and advance to still greater triumphs. The fields which render us the world's chief producer of breadstuffs are still fertile, and capable of enlargement and intensification of production; the plantations which make us the chief producer of the world's cotton can double their product, if desired; the supply of coal and oil for heating and lighting seems inexhaustible, and their area is being increased rather than diminished; the mines which supply the material for manufacturing show no signs of exhaustion; the transportation systems are increasing their carrying capacity, and by the addition of thousands of miles of railway each year are developing new areas, and the manufacturing systems are steadily increasing their capacity until they can now produce far more than the present requirements of our population.

The meaning of all this, it seems to me, is plain. It is that our foreign commerce is to continue to expand, and that we are not only to remain the world's greatest producer and exporter, but that the growth, unless checked by some unwise course at home or by unforeseen circumstances abroad, is to continue indefinitely. We hear threats of the exclusion of our products by certain countries, and rumors of European combinations against the United States; but neither past experiences nor the logic of the situation seems to justify the belief that this will be realized.

For years we have heard of legislation by European countries against American meats, yet our exports of provisions have steadily increased and were 50 per cent greater in 1901 than in 1890, and in 1904 it was the largest in the history of our foreign commerce, and about 80 per cent of our provisions go to Europe. We hear from time to time that certain countries have made laws or rulings adverse to certain of our products, yet the total of our exports to those very countries continues to steadily increase. We have heard in recent years of the prospective boycott of American manufactures by European countries, yet more than one-half of our exports of manufactures last year went to Europe, the greatest manufacturing center of the world. A few years ago a dozen countries simultaneously protested against a pending tariff measure, yet that measure was enacted without reference to those protests; and to-day every one of those countries is taking more of our exports than they had ever done prior to that protest.

Sentiment does not rule in commerce. The question which the purchaser asks is not "Where was this article produced?" but "What is the price and quality?" If the price is lower and the quality better, he makes no objection to the legend, "Made in America," but rather welcomes it if he can rely upon it as an evidence of good faith in quality and price.

It is clear that the millions of purchasers all over the world, or even those of any particular country, are not likely to enter into combinations against American products or manufactures. But are the countries themselves likely to do so? Let us reflect for a moment as to what would be the result of such action. The United States produces one-fifth of the wheat of the world, one-half of the meats which enter into international commerce, about four-fifths of its corn, and three-fourths of its cotton. Of all these Europe must import large quantities. The importation of wheat into Europe from extra-European countries aggregates (including flour in terms of wheat) 265,000,000 bushels per annum, and of this, 150,000,000 bushels, or nearly three-fifths, is from the United States. Europe's importation of corn from other countries is about 200,000,000 bushels, and nearly all of this is from the United States.

What would be the effect of a refusal by Europe to purchase our wheat, or our corn, or meat, or cotton? It would be the exclusion from the world's principal markets of three-fifths of its present importation of wheat, one-half of its importation of meats, three-fourths of its importation of cotton and nearly all of its present importation of corn. What would be the effect of this exclusion of our supply of these articles? I do not mean to intimate that Europe could not exist without our wheat or corn or meats or cotton. But what would be the effect upon prices of the limited supply that other parts of the world could furnish? Imagine the effect upon the price of wheat if one-half the amount which enters into international commerce were wiped out of existence to-day. Imagine the effect of the elimination of three-fourths of the corn supply. Think what would be the effect on the price of cotton to-morrow if some vast conflagration to-night should destroy three-fourths of the visible supply of the world. Competition among producers and plentifulness of supply assure low prices, while the elimination of the principal competitor and largest producer would naturally and necessarily cause great advances in the price of the remaining supply of any of these articles.

We may therefore assume that at least in these great articles of general requirement there is no probability that we are to be excluded from the European market. Even in manufactures, of which Europe has been in the past the chief producer, our marvelous facilities for production are enabling us to compete in both quality and price. During the brief period since 1895 we have heard much talk of European exclusion of our manufactures, but our exports of manufactures to Europe alone in a year are more than those to the entire world in 1895. Europe, it may be added, is our greatest customer in all classes of exports. Europe takes over 50 per cent of our exports of manufactures, 90 per cent of those of agriculture, and 60 per cent of all others or 76 per cent of the grand total.

Taking the grand divisions, one by one, our export figures are as follows: To Europe, $1,136,000,000, of which 19 per cent was manufactures; to North America, other than the United States, $196,000,000, of which 49 per cent was manufactures; to South America, $45,000,000, of which 60 per cent was manufactures; to Africa, $25,000,000, of which 40 per cent was manufactures; to Asia, $50,000,000, of which 66 per cent was manufactures, and to Oceania, $35,000,000, of which 80 per cent was manufactures. Comparing the exports to Europe alone with those of the remainder of the world as a whole, it may be said that the exports to Europe were $1,136,000,000, of which manufactures formed 19 per cent, and to the remainder of the world $351,000,000, of which manufactures formed 56 per cent. The total exports of manufactures were $412,000,000, and of this 52 per cent went to Europe and 48 per cent to other parts of the world. The total exports of products other than manufactures were $1,075,000,000, and of this 85 per cent went to Europe and 15 per cent to other parts of the world.

What are we to conclude from all this? First, that the continent which takes one-half of our manufactures, even though it be a great manufacturing center, is a promising field for standard goods of high grades and reliable qualities, to be sold at small margins of profit; second, that the other parts of the world, which also take one-half of our manufactures, are a promising field for goods of special types, of qualities and forms varying with the customs and demands of the people in the section to be supplied. Each field needs careful attention in order to assure success—that of Europe because of the sharp competition which may be expected from local manufacturers; that of other countries because of the special requirements of local custom relative to color, size, form, and packing. The fashions of central Africa or the South Sea islands are as exacting as those of London or Paris, and the manufacturer must study the peculiarities in each field with equal care, even though the number of prospective customers in the former is less and the difficulties of establishing a permanent market greater than that among people whose requirements are similar to our own. In Europe and Canada we may expect to sell from the general stock of merchandise made for the great population of the United States; in Asia and Oceania and Africa and Spanish America the sales to the other than English-speaking population can most readily be expanded with goods specially prepared or selected, specially packed, specially offered, and sold on special terms.

This brings us to a consideration of the existing markets in the various countries, the share which we now supply in them, and the share for which we may still compete. The total imports of European countries are over $8,000,000,000, of which we supply about 15 per cent; those of Asia and Oceania, $1,200,000,000, of which we supply about 10 per cent; those of South America, $375,000,000, of which we supply about 10 per cent; those of Africa, $430,000,000, of which we supply 5 per cent; and those of North America, other than the United States, $400,000,000, of which, by reason of proximity, we supply about 40 per cent. While a considerable share of the commerce of any country is a mere exchange with contiguous or adjacent countries, it may be assumed that as a rule fully one-half of the imports of these grand divisions is of a character for which we may compete, thus indicating that there are still great possibilities for the American producer and manufacturer in all parts of the consuming world, and that with patience, diligence, and fair dealing he may expect to make two blades of grass grow where now only one exists.

But before leaving this subject I want to call your attention to a feature of our import trade which has heretofore received little attention, and point out its important relation both to our home industries and the possibilities of new markets abroad. In the enthusiasm over our growing exports of the past few years we have given little attention to the growth of our imports. While it is true that our per capita of imports has been perceptibly reduced in the last thirty years, it is also true that the grand total of imports is slowly but steadily increasing.

In 1903 our imports for the first time exceeded a billion dollars and have been in that neighborhood since. What does this mean? Why is it that with the splendid growth in the home production of nearly everything that man requires, and the wonderful development of our manufacturing industries, we are still increasing our imports? We produce, as I have shown you, a surplus of nearly everything required by man for his daily life, and we are the greatest manufacturing nation of the world. Why, then, do our imports continue to grow, despite the increased products of our fields, and forests, and mines, and factories?

The answer is simple. In one great class of products we have been in the past absolutely dependent on other countries. While it is true that we are the world's greatest producer of bread and meat and coal and iron and steel manufactures, we have been in the past entirely dependent upon other parts of the world for tropical products. And it is in these articles that the chief growth in our importations has occurred. Year by year the people consume increased quantities of tropical productions for food and drink.

The total of our imports has doubled since 1870, but the imports of tropical and subtropical products have practically trebled in the same time. The value of our imports classified as "manufacturers' materials" only a dozen years ago was $265,000,000 and amounted to 33 per cent of the total; in 1904 the value of manufacturers' materials imported was about $420,000,000, and formed more than 46 per cent of the grand total.

What does this mean? Clearly that we are increasing our dependence upon the tropics.

What does it mean to the producers and manufacturers and exporters of the country? Clearly that they should seek to pay in the products of the field and factory for the increasing millions of tropical products which they import and must continue to import, and that in the great undeveloped markets of South America and Africa and Asia and Oceania, which supply these tropical products, we should seek to enlarge our sales and encourage mutual interchange of commodities.

What does it mean to this nation, which has recently extended its control over three great groups of tropical islands, with an area of 150,000 square miles, a population of 10,000,000, people and an unmeasured possibility for the production of the very articles which we are now importing in increased quantities and must continue to import in greater quantities? Clearly that much of this great mass of the necessities of life and manufacture which we are now importing can be produced under the American flag, with American capital, and by American citizens.

Any one of these islands, Porto Rico, Hawaii, Guam, Tutuila, and the Philippine Islands, is capable of producing a part of the hemp, the jute, the coffee, the cacao, the tropical fruits, the sugar, the high-grade tobacco, and probably the silk and the tea and the india rubber for which we are now sending hundreds of millions of dollars to other countries. I would not see them take a dollar from the earnings of the American farmer, but until he can produce at home the sugar and high-grade tobacco and silk and rice for which we are now sending our millions abroad, why should we not expend that money in our own islands, and in so doing build up in them a splendid market for our own products?

The Hawaiian islands have increased their producing power more than twentyfold since we annexed them commercially by the reciprocity treaty of 1876, and have also increased their consumption of our products twentyfold. In the short time since the actual annexation of those islands their production has enormously increased and our exports to them have more than trebled. In the few years since Porto Rico came under the American flag it has trebled its supply of tropical products in our markets and more than quadrupled its consumption of American goods. In the few short years since the American flag was hoisted at Manila our exports to the Philippine islands have increased tenfold and those to all Asia and Oceania have doubled.

With a continuation of the vigor in production, the care in manufacturing, and the integrity in business dealings which have characterized our commercial history in the past we need have no fear for the future of our foreign commerce. There will undoubtedly be years in which the unexampled demands of the home market or the depression of that of other countries may temporarily check the growth in the exportation of manufactures, or the temporary failure of some great crop, like that of corn may reduce the surplus of agricultural products which we can spare for our neighbors in other parts of the world. But these are mere incidents, temporary in their character, and not likely to seriously affect the steady forward movements in our export trade. Indeed, these incidents, when they do occur, serve rather to exemplify the great diversity of our productions and the possibilities of growth which that diversity supplies.

The fact that the importations of manufactures have steadily fallen and the exportations of manufactures steadily increased until we are now constantly exporting more of manufactures than we import, gives me a complete assurance, a perfect confidence, that American manufacturers will not only capture this remaining $200,000,000 of the home market still available, but will go steadily forward in the work of capturing foreign markets. True, our imports must continue to grow, but that growth will be in the raw materials which the manufacturer must use, and in the tropical products which our own fields do not produce; and even these will soon be supplied, in large part at least, by the islands which have recently come under our control.

When these two things shall have been accomplished, when the American manufacturer shall supply the high grade manufactures now imported, but which he will soon be able to produce, and when our new islands shall supply the tropical products which we must have, the United States will occupy the unique position of producing within her own boundaries all of the requirements of her own people and will continue to supply other nations from her growing surplus the natural products and manufactures which they demand and which they will continue to demand in increasing quantities.

I do not share in the fear which some have expressed that this condition, by which exports are to constantly exceed imports, is likely either to destroy our markets abroad or unsettle international finances. Certainly the experiences of the last thirty years do not sustain either of these theories. In that time our exports have exceeded our imports by the enormous sum of $5,000,000,000. What has been the result? Has this constant excess of exportation, this persistent refusal of the people of the United States to expend in the markets of the world every dollar that they get in return for their exports, resulted disastrously in any way?

We have meantime been solemnly informed with reiteration that "if you don't buy you can't sell;" but nevertheless we have gone on selling at an increased rate every year, not only in those natural products which the world must have for food and clothing, but in manufactures, which we can now supply more cheaply and in better form than others, because of our great natural facilities of which I have already spoken. We have been informed that if we persisted in this ruinous course of refusing to redistribute to the world the money which we receive for our products, we should so disturb the world's currency balances as to produce some awful financial cataclysm.

But has this happened? It is true that we have somewhat bettered our financial condition, that the amount of money in circulation in this country has been increased, and the amount per capita doubled. But is anybody among us complaining of that fact? Has the wonderful business activity which has existed over the entire business world during the past few years sustained the theory that the United States is destroying the prosperity of other countries by selling more than it buys?

We have not been bringing into the country and storing away in our vaults the money represented by the excess of our exports during that time. We have been paying our debts abroad—at least a part of them; we have been sending our citizens all over the world to redistribute the money and get the value of it in new information, new ideas, new views of life, new experiences, and new health and vigor. We have been investing our money in the securities of other nations, and are beginning to make ourselves, in a very limited way, a creditor nation. And we have been distributing a part of this surplus in paying freights on our products carried in other people's vessels, a custom which I hope will soon terminate and be substituted by the sight of the American flag in all parts of the world, and the payment to American vessel owners of the large sums paid in the past to those of other countries.

We are not insisting, at least not many of us, that the men in our own nation or our own community who accumulate a competence by selling more than they buy shall redistribute that surplus by purchasing what they do not need. On the contrary, they are benefiting the community and the nation and the consuming world by utilizing that accumulated capital in enterprises which by their very magnitude decrease the cost of the articles which the people must consume, and at the same time increasing employment and the sums paid for that employment. And why should the world insist that we should terminate that system under which we are paying our debts abroad, making our people prosperous and our country the greatest of producing, manufacturing, and exporting nations?

Our foreign indebtedness still amounts to probably $2,000,000,000 and our national debt to one billion. Until we are able to pay this great sum of three billions of indebtedness and stand forth before the world as free men, as a nation absolutely free of obligations to other countries or to its own citizens; until we are able to take the rank to which we are entitled as a great creditor nation, supplying to the other countries the funds for which they are constantly seeking in the money markets of the world; until our sails shall whiten every sea and the millions of dollars which we are now paying to foreign shipowners pass to the hands of the owners of our own vessels, let us be content with the present order of things. Let us seek to increase rather than decrease the surplus of our exports; let us strengthen the hands of our producers and manufacturers, and in so doing strengthen those of the millions to whom they give employment; and if we are able to give to our neighbors in other countries the benefits of our industries at reduced cost of production but with fair margins of profit, our prosperity will be regretted by none, and we shall have benefited mankind as a whole by giving them our products at a low cost while we were benefiting our own producers and manufacturers and workmen and our whole people.

Those who fear that the prosperity of a single nation in the world's great family and a continued excess of exports over imports are likely to seriously unsettle the financial conditions and cash balances of the world do not, perhaps, sufficiently consider the enormous increase which has taken place in the world's money during the lifetime of the present generation. The world's gold production in the last four hundred years amounts to a little over $10,000,000,000, and one-half of that amount has been produced in the last forty years. The world's silver production in the last four hundred years has also been $11,500,000,000 in value, and practically one-half of that has been produced in the last forty years. In other words, it may be said that the quantity of the precious metals now available for currency or as a basis for international currency is fully double that of forty years ago, and that the modern systems of finance, banking, and exchange, by which a scrap of paper passing by fast mail between continents, or a message by cable which passes in an instant, may represent a million or a score of millions, has many times multiplied the value of this greatly increased supply of currency for use in business transactions.

While the increase in gold and silver does not necessarily mean a like increase in actual wealth of the nation showing this increase of money, the statisticians of Europe show that the leading nations have greatly increased in wealth during the very time in which we have been selling them so much more than we were buying from them.

What of the future? What is the promise of this magnificent country of ours, this land of plenty, where are now produced more of the requirements of life than in any other land, and which is to become a perfect unit through this addition of tropical territory, to give us the one class of materials in which we have been lacking in the past?

In my mind's eye I see a great, a wonderful development, far beyond that before which the world now stands in amazement. I see Niagara and countless smaller waterfalls furnishing electricity to be carried by wire to every city and hamlet and farm, to be used for light and heat and power, in manufacturing, and for transportation on rivers and canals and railways and roads. I see a great canal connecting the two oceans, and putting our eastern and western shores in close water communication and our great ports in direct touch with the markets of the whole world. I see another ship canal connecting the great lakes with the Atlantic, with ocean vessels landing at the docks of Cleveland and Chicago and Milwaukee and Duluth, and making that greatest producing section of the whole world a great ocean frontage. I see another canal connecting the lakes with the Mississippi river, and a great system of light draft steamers and barges carrying the products of that great valley to the ocean steamship upon the lakes or the Gulf of Mexico, as convenience of location may determine. I see an American cable giving us facilities for instant communication with our islands of the Pacific and the Orient, and those islands supplying us with hundreds of millions of dollars' worth of their productions and taking hundreds of millions of dollars' worth of our products in exchange. I see the islands of the Gulf of Mexico one by one knocking at our doors and coming under the American flag and furnishing us through open doors their tropical products to mingle with those of the islands of the Pacific. I see a great railway line extending from Alaska at the north to Argentina at the south, connecting the railway systems of the two continents and bringing the great markets of that continent into close relation with our own. I see a steady growth of American influence and a development of closer commercial relations with our neighbors on the north and on the south. I see a magnificent fleet of steamships, controlled by American capital and genius, and many of them flying the American flag, penetrating every sea, carrying American goods to every continent and every clime, and sending them to the interior of every country by American engines, in American cars, and upon American rails. I see the product of the American farm and factory in every land throughout the civilized world, and with this accomplishment, increased prosperity for American producers and manufacturers, and increased happiness among all classes of American citizens.

FOREIGN VIEW OF AMERICAN COMPETITION.

BY FREDERIC EMORY.

[Frederic Emory, chief of the bureau of foreign commerce, United States department of state; born Sept. 18, 1853, at Centreville, Maryland; he was educated at the Centreville academy, and at St. John's college, Annapolis; during his early life until 1893 he was a newspaper writer on the staffs of the Baltimore Sun, the Public Ledger of Philadelphia and other papers; in that year he was appointed secretary of the bureau of the American republics and in 1894 chief of the bureau of statistics, department of state; during the year 1898–99 he was also a director of the bureau of the American republics; he is the author of a novel entitled A Maryland Manor, and has edited a large number of reports connected with his work, besides making contributions to the journals and magazines.]

At the present time, the United States may be said to be nearing the top wave of industrial eminence, and there is ample reason for the belief that the next few years will witness a great expansion in the sale of our more highly developed manufactures. Nothing could well be more gratifying than the picture of our foreign trade as it is to-day by comparison with the figures of very recent years. It is all the more remarkable because our progress has been achieved with but little effort and by means not directed specifically to the promotion of foreign trade, but largely fortuitous, and springing from our intense absorption, for many years, in domestic industry and internal development. In other words, we have reached a surprising eminence in the exportation of manufactured goods, not because we were seeking that goal, but because, in developing our resources, in manufacturing for the home market, we attained an excellence and comparative cheapness of production which, to the astonishment of ourselves as well as of the world at large, has suddenly made us a formidable competitor—perhaps the most formidable of all—in the great international rivalry for trade.

The most striking fact in our export development is the remarkable growth of the foreign demand for our iron and steel, our exports amounting to nearly $130,000,000 in 1900, against $32,000,000 in 1895. In an article in the New York Evening Post of January 12, 1901, Mr. Andrew Carnegie says the United States has not only supplied its own wants, "but is competing to supply the wants of the world, not only in steel, but in the thousand and one articles of which steel is the chief component part," and expresses the opinion that the increasing demand from the world at large "can be met only by the United States." "The influence of our steel making capacity," adds Mr. Carnegie, "must be marvelous, for the nation which makes the cheapest steel, has the other nations at its feet as far as manufacturing is concerned in most of its branches. The cheapest steel means the cheapest ships, the cheapest machinery, the cheapest thousand and one articles of which steel is the base."

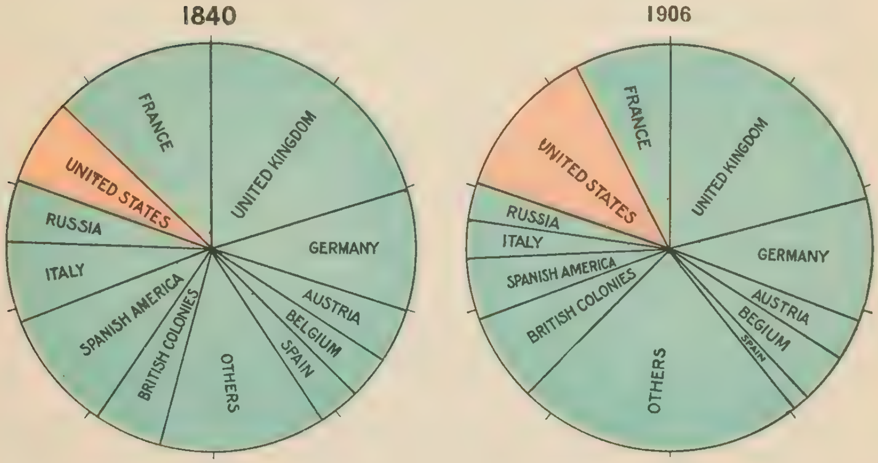
It is the relative cheapness of American steel that has given it pre-eminence, and it is the same with other products that are winning their way abroad. Economy of production is the master key that unlocks for us markets that seemed a little while ago to be inexorably closed. This economy of production implies not merely low prices to the foreign consumer, but a greater degree of excellence, a superior adaptation to his wants. The American workingman, though receiving higher wages, produces, with labor-saving machinery, at a lower unit of cost, and his greater application and ingenuity enable him to avail himself effectively of the most recent inventions and appliances for improving the quality of his special line of work. The American factory system is highly organized and more efficient than any other, and, if our export trade were as well developed, there would be little to fear.

It is evident that foreign observers are keenly alive to the greater efficiency of our industrial methods, and are seeking earnestly to profit by them. A writer in the London Times attributes the American manufacturer's advantages over the British largely to the consideration shown to young men and the willingness to utilize their energy and enterprise. He lays stress upon the fact that it is customary for American fathers "to discuss their business affairs with their sons in a way that is quite surprising to an Englishman," and adds:

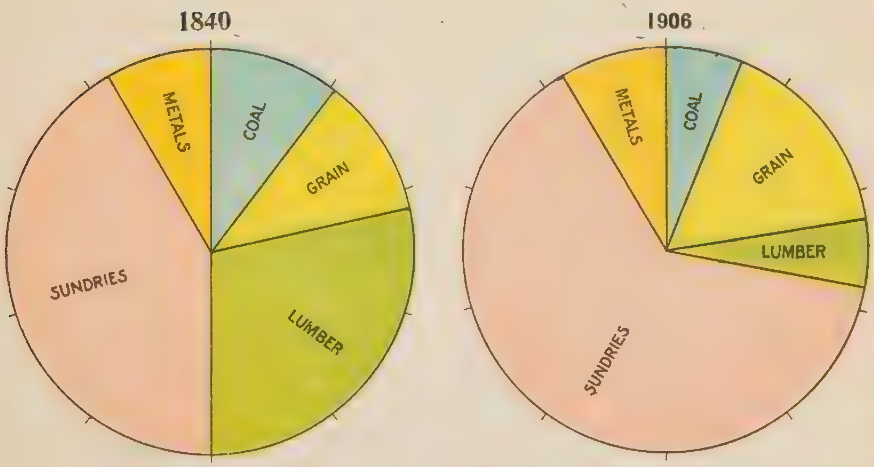
> A good many years ago, I spent a few evenings with some students of one of the large American colleges. I was new to America then, and heard with surprise these college youths

INTERNATIONAL COMMERCE

PROPORTIONS CORRESPONDING TO PRINCIPAL NATIONS



PROPORTION OF SEA BORNE MERCHANDISE



discussing questions that arose out of the business in which their fathers were engaged. If we compare this with what generally happens when lads of our own public schools or young men at our own universities meet together—when any mention of the paternal shop would be looked on as the worst of bad form—I think perhaps there will be seen one of the reasons why Americans are fitted to control business at an earlier age than is usual in this country.

The American youth, as pointed out, obtains his business education from practical experience and social intercourse, and this form of education is held to be "immeasurably above the mere learning of lessons which too often goes by the name of education." Another reason for the adaptability of American youth to business is stated to be the public school system, which is, "more truly educational, less pedagogic." In conclusion, the Times' correspondent says:

To me, it appears one of the most disquieting factors in the problem before us (industrial competition) that the United States have trained a body of young men who are determined to make their country great, and who have been educated to a living, practical interest in the things needful to that end.

The Times, commenting editorially on these views and upon others expressed in a previous series of articles, says: "The threatened competition (of United States manufacturers) in markets hitherto our own comes from efficiency in production such as has never before been seen," and accepts the view that this efficiency is to be ascribed, to a large extent, to the practical self-education of Americans, which enables them generally to enter business "with a stock of knowledge of which the young Englishman fresh from the university or a public school has not an inkling." Further on the Times says:

In the interesting analysis of the causes at work adverse to England, something might be said of the great intelligence and zeal put into affairs. The American man of business takes his pleasure in what he is doing, and never fails when he is traveling to look out for hints to be applied when he returns home. Not afraid to admit that he is "in pork" or "in grain," if the fact be so, he is curious as to all that affects his business, and he is open to new ideas in a way which is unusual with us. "What has succeeded in the past will not succeed in the future" is a working maxim with the best men of business, who are ready to throw their experience as well as their antiquated machinery on the scrap heap. There are some signs of a change in this respect in this country; but the idea that there is something respectable, solid and satisfactory in doing in the mill, workshop, and counting house what one's father did dies hard.

The London Spectator quotes "a competent writer" in a British trade paper as saying:

From a careful calculation, made after comparing notes with other observers, and taking the figure 1 to 1¼ as representing the producing capacity of the ordinary British workman, I consider the Swiss-German as fairly represented by 1¾ and the Yankee by 2¼.

In an article entitled "America's Changed International Position," the London Statist also dwells upon the superiority of our methods of production as enabling us to take advantage of the needs of Europe and to respond to an increased demand for manufactured goods. "All at once," says the Statist, "the United States became a keen competitor in the markets of the world with ourselves and with our continental rivals, and, in all reasonable probability, the competition will grow more eager as the years pass." The Statist, in fact, predicts "a great outburst of new enterprise in the United States."

Lord Rosebery is quoted by cable as having said in a speech before a British chamber of commerce that the chief rivals to be feared by Great Britain are America and Germany. "The alertness of the Americans," he continued, "their incalculable natural resources, their acuteness, their enterprise, their vast population, which will in all probability within the next twenty years reach 100,000,000, make them very formidable competitors with ourselves.

"There is one feature of the American competition which seems to me especially formidable. We are daily reminded of the gigantic fortunes which are accumulated in America, fortunes to which nothing in this country bears any relation whatever, and which in themselves constitute an enormous commercial force. The Americans, as it appears, are scarcely satisfied with these individual fortunes, but use them by combination in trusts, to make a capital and a power which, wielded as it is by one or two minds, is almost irresistible, and that, as it seems to me, if concentrated upon Great Britain as an engine in the trade warfare, is a danger which we cannot afford to disregard. Suppose a trust of many millions, of a few men combined so to compete with any trade in this country by underselling all its products, even at a considerable loss to themselves, and we can see in that what are the possibilities of the commercial outcome of the immediate future."

It has been evident for some time that the United States, not content with having solved that part of the problem of economy of production which relates to processes of manufacture and the utilization of labor, has been drifting instinctively towards the larger question of the concentration of capital as the logical development of the same general idea of reducing cost and increasing the margin of profit. The question is larger because it has a more direct and more general bearing upon the economic and social life of the nation, upon the interests, real or imagined, of the whole body politic. We have to do with it here only because of its relation to and possible effect upon our foreign trade, and it is interesting to know that so thoughtful an observer as Lord Rosebery perceives in the simplification of the use of capital in the United States which is going on—it may be said experimentally, to a large extent as yet—a tremendous power in the commercial rivalry of the world.

Germany, as well as Great Britain, seems fully sensible of the seriousness of American competition. In a recent issue, the Hamburger Fremdenblatt points out that the United States, which ten years ago exported more than 80 per cent of agricultural products and less than a fifth of manufactured goods, to-day draws nearly a third of its entire exports from the products of its factories. "In other words, the Union is marching with gigantic strides towards conversion from an agricultural to an industrial nation." "Does not the rapid increase of the United States in the value of industrial exports," the Fremdenblatt asks, "constitute an imminent danger from all competing nations?" Continuing, the Fremdenblatt says:

If we now turn to an investigation of all the elements which have produced this tremendous, this almost incredible, revolution in the world's situation, it is impossible within our present limits to consider all the factors which are of importance to German interests as well as essential to a comprehensive conclusion. Competent experts, well informed as to the industrial and export conditions which prevail in the United States, have established the following facts:

The steel manufactories of the United States, which two decades ago were in their infancy, to-day control the markets of the world, dictate either directly or indirectly the prices of iron and steel in all countries, and partly through the richness of their supply of iron ores and coal, partly by the use of labor-saving machinery and skillful, effective means of transportation, have attained a position to not only compete with the older iron and steel-producing countries, but even to profitably export their products to England.

American tools, especially hatchets, axes, files, saws, boring implements, etc., enjoy, by reason of their excellent quality, the best reputation, and, in spite of their higher price, stand above competition in nearly the whole world. Also in sewing machines, bicycles and agricultural implements of every kind, the United States has begun to drive England and Germany from the world's markets, especially that of Russia, which may be partly attributed to the fact that American firms are protected in their own market from foreign competition and can thus sell their manufactures cheaper abroad than at home.

A remarkable change has also taken place in the field of boot and shoe production. Hardly more than ten years ago the United States imported shoes from Europe—especially women's footwear from Austria, while other grades were made of leather imported from England and Germany. To-day, it not only makes its entire supply of leather at home and exports it in considerable quantities, but it floods Europe with ready-made shoe depots in Paris and even in the principal cities of Germany.

That the United States, by reason of its richness in mineral oils and aided by its unrivaled facilities for refining and transporting this international necessity, controls the petroleum trade of the world and is held in check only by Russia is well known, and the fact is only cited here in order to include this weighty factor in the calculation. The experience of the past proves that within a not far distant period, the coal of the United States will play the same rôle in the markets of the world. The Union has reversed the old adage, "It is ridiculous to carry coals to Newcastle," for to-day anthracite coals from Pennsylvania are actually exported to England.

Incidentally, it may be remarked that the typewriting machine with which this article is written, as well as the thousands—nay, hundreds of thousands—of others that are in use throughout the world, were made in America; that it stands on an American table, in an office furnished with American desks, bookcases and chairs, which cannot be made in Europe of equal quality, so practical and convenient, for a similar price. The list of such articles, apparently unimportant in themselves, but in their aggregate number and value of the highest significance, could be extended indefinitely. But it would seem more interesting and characteristic to cite the fact that an American syndicate is now planning, and has even taken the initial steps in a scheme, to take in hand the whole sleeping-car service of Europe, to improve it and make it cheaper than is now possible. Moreover, American manufacturers of underclothing, gloves and men's clothing, as well as women's cloaks--all articles which a few years ago were exported in vast quantities from Europe to the United States—are already beginning to calculate how they can place their surplus output in European markets.

The Fremdenblatt's conclusion is that Europe "must fight Americanism with its own methods; the battle must be fought with their weapons, and wherever possible their weapons must be bettered and improved by us. Or, to speak with other and more practical words, Germany—Europe—

must adopt improved and progressive methods in every department of industry; must use more and more effective machinery. Manufacturers as well as merchants must go to America, send thither their assistants and workingmen, not merely to superficially observe the methods there employed but to study them thoroughly, to adopt them, and wherever possible to improve upon them, just as the Americans have done and are still doing in Europe.

Dr. Vosberg-Rekow, head of the German bureau for the preparation of commercial treaties, attributes the remarkable growth of exports of American manufactures to Europe, in part, to the activity of our consular service. "The United States," he says, "has covered Europe with a network of consulates and makes its consuls at the same time inspectors of our exports and vigilant sentinels, who spy out every trade opening or advantage and promptly report it." Dr. Vosberg-Rekow also dwells upon the eminently practical character of American industrial and business methods. "Germany's industrial advancement," he says, "is principally due to the thoroughness of her technical education. It is strengthened by the continuous substituting of machinery and machine tools for hand labor. Still, in this respect, the English industry in some branches is ahead of us. It is worthy of note that in this evolution, too, the United States has the foremost place and has made gigantic strides, not only in applying machine tools, but in inventing and manufacturing them, so that to-day she supplies us. This signalizes in an extraordinary degree American intelligence. Thus, the Americans, though wanting our superior technical education, thanks to their practical eye, improve upon our methods and apparatus. Theirs is rather the activity of an experimentalist than that of a trained craftsman; but a clever faiseur, if he but have assurance and luck, may distance the educated master. The Americans have no thorough education; nor do they possess a modern industrial system as we Europeans understand the term. The American applies himself to a single branch or to a specialty, with utter disregard of European methods and their results; he devotes to his work an amount of energy which stupefies Europeans;

and, for awhile, he succeeds in driving us out of the line of articles on which he has centered his energy. Against such peculiar activity a general trade policy is quite ineffectual; we must put ourselves in condition to counteract this artificially forced growth of specialized industry.

Thus we find that expert opinion in Great Britain and Germany coincides in the conclusion that Americans, too eager to be up and doing to apply themselves to preparatory study or to what may be termed a general scheme of education and culture for industry and trade, have, nevertheless, worked out in practice a degree of actual efficiency, not learned from books, which gives them a distinct advantage. It is not to be denied, upon the other hand, that technical schools and special courses of commercial education might greatly enhance our capabilities, if care were taken to prevent them from usurping too far the practical business or industrial training which seems to be the secret of our success thus far. In the more and more strenuous competition which is evidently awaiting us, our manufacturers, exporters and trade representatives abroad will need to be provided with a variety of information which cannot be acquired except by academic instruction. The knowledge gained in the workshop or the counting house will not suffice to meet a rivalry which is seeking to equip itself, so far as it can, with our machinery, our industrial and trade methods—with everything, in short, that now gives us supremacy—and will add to these the mastery of details of trade conditions and industrial processes throughout the world, which we are only beginning to study.

There is another feature of American influence in the world's markets which is, perhaps, even more notable than our industrial progress, and that is our suddenly acquired financial independence. The Hamburger Fremdenblatt article previously quoted from points out that it is the logical result of our growth in industry and trade and especially of our successful competition in foreign markets. As soon as American industries, through various causes, found themselves in a favorable financial condition, "they likewise undertook the task of freeing themselves from foreign capital—

in other words, of reclaiming the industrial securities which were in European hands." "The change in the condition of the United States," adds the Fremdenblatt, "can best be characterized by the statement that the industries, trade, agriculture, railroads and finances of the Union each and all climbed, one upon another, through and by each other steadily upward. And to what a height they have climbed!"

The point has been reached where the United States has become a lender of money to other countries instead of a borrower from them. "Speaking roughly," said the London Statist, in 1901, "the holdings of American securities in Europe now are immensely smaller than they were ten years ago, and the purchases have been made by the Americans out of the vast savings accumulated, first, during the anxious period from 1890 to 1896, and, secondly, during the prosperous period that has followed. Many countries, however, are able to buy back their own securities without being in a position to take an important place in the international investment market. For example, Spain has bought back a very large proportion of her own securities. In the United States, not only has the buying back of American securities been on the great scale indicated, but during the past year or two, American capitalists have lent largely to Europe. At the end of 1899, when there was great pressure in the money markets of Europe, about four millions of gold were allowed to be shipped from New York to London; and during the past year it will be recollected that gold was sent in considerable amounts, while about five millions sterling were invested in [British] government funds. German government funds were also bought amounting to about four millions sterling. Russia was able to borrow in order to purchase railway material. And it is understood that the United States was willing to lend likewise to Switzerland and to other governments. This is the most dramatic change that has occurred for a very long time."

"The succession of extraordinary creditor balances," says the New York Journal of Commerce, "has virtually revolutionized our financial relations with the European centers. In a very important sense, we have become the creditor nation of the world. From a chronic condition of dependence upon the banking forces of London, Paris and Berlin, we find those centers now dependent upon the large floating balances of the United States, subject to our lending ability in periods of exigency, carrying the largest stock of gold in the world and holding the largest resource for dealing with crises in international finance. Three of the foremost European governments—England, Germany and Russia—have found it necessary to come to New York for important loans, and the two former have not applied in vain."

One of the most important financial features of the year," says Bradstreet's, in a recent review of the stock market in 1900, "was the placing in Wall Street and with American investors of issues of British consols, German government bonds, and loans by Russia, Sweden, and other countries, giving point to the feeling that our market has taken the lead in the financial world."

Summed up, therefore, the general conclusion of competent foreign authorities, as well as of our own, is that the commercial expansion of the United States is no longer problematical, but a fact of constantly enlarging proportions which opens up new vistas in the struggle for ascendency among the industrial powers. Prolific as it has been of great surprises, it is doubtful whether similar phenomena will spring from its undemonstrated forces. It would seem, now that the causes of our unlooked-for triumphs are known and are being carefully weighed and studied, that the future will be one of fruition, of the gradual maturing of our powers, rather than of sudden blossoming of some novel capacity of competition. The day, perhaps, is not distant when the more intelligent of our rivals will be able to meet us upon more nearly equal terms and when, as has already been indicated, it will be necessary to supplement our natural advantages and our highly developed industrial efficiency with the appliances of education, of special training, of technical skill, of more scientific methods of extending trade, which have already secured rich returns—to Germany, for example—in quarters of the globe where our goods as yet have made but little if any headway.

Besides the surprising development of our sales of manufactured goods in the most advanced industrial countries of Europe, which may be said to have introduced an entirely new element into old world trade, we find other phases of commercial expansion which were quite as unexpected and are likely to profoundly affect our economic and perhaps our political future. The rapid growth of cotton manufacturing in our southern states, for example, could not have been anticipated a few years ago, although it seemed probable to those familiar with the peculiar advantages of the south for engaging in this industry that some day that section would emerge from its position of dependence upon outside markets for the consumption of its cotton and create its own home markets by the erection of mills.

There are now nearly 4,000,000 spindles in the south, against 1,360,000 in 1889, and new mills are constantly being built, although the past year has witnessed depression in the industry due to the troubles in China. The entrance of the south into oriental trade is almost as novel a feature of our expansion as any that have been indicated, and it is one that seems likely to have a most important bearing upon our social and political evolution, as well as upon our influence in international trade. The south has suddenly acquired a great stake in the affairs of the far east, and what this may mean in the adjustment of our relations with other countries having large interests there and in shaping our international policies is a question which only the future can answer. In a memorial from the cotton manufacturers of the south addressed to the secretary of state, commending the "open-door" policy in China, the statement is made that a large part of the production of the cotton drills and sheetings manufactured in southern mills is exported to North China, and that "the prohibition or interference in China by any European government would tend to seriously injure, not only the cotton manufacturing industries, but other important products of the United States which are being shipped to China. For the protection and perpetuity of these commercial relations," it is added, "we earnestly pray that the administration will take such action as may be proper under existing conditions. It is not only the manufacturers of cotton goods that would be seriously affected, but the southern planter and cotton grower, who finds a ready cash sale for his products at his very door; and also the thousands of employees and laboring classes who are engaged in the cotton mills and depend on the success of these manufacturing industries for a livelihood."

The developments of the past few years in consequence of our acquisition of the Hawaiian and Philippine islands have brought another factor into prominence in our commercial development, which may be potential of unlooked-for results. The Pacific slope is rapidly being converted from a mere outpost of trade into a great hive of commerce. Not only San Francisco, but Port Townsend, Seattle, Tacoma and Portland, are becoming entrepôts of Oriental and South Pacific commerce, and San Diego seems likely to be an important factor in the development of trade with the west coast of Latin America. The growth of sea-borne commerce at these points means much for the great extent of country tributary to them and promises to work marked changes in the industrial condition of the vast region west of the Rocky mountains. In a similar way, our southern group of states may find a sweeping readjustment of their economic relation to the rest of the union in the fact that Cuba and Porto Rico now offer them easy and convenient stepping stones to Latin American trade.

Even in the now familiar conditions affecting the Atlantic seaboard, which, as we have seen, have recently produced a great increase in our export trade, a new element appears in the statement of our consul in Sierra Leone, Mr. Williams, that, in a few years, west Africa will offer a market for our goods only second in importance to that of China. East Africa and south Africa have already shown a marked preference for certain lines of American manufactures, but west Africa is for our exporters a new and more accessible market, the possibilities of which have heretofore attracted but little attention.

As yet, the widest range of consumption of our goods is found in the leading industrial countries, such as Great Britain, Germany, France, and their willingness conjoined with their greater capacity to take our products raises the interesting question whether our activity in competing for neutral markets, such as China, Africa, South America, etc., is not, for the present, restrained by the fact that our energies are largely employed in manufacturing for the European demand. The seriousness of our competition in the development of trade in countries which, as yet, are but imperfectly exploited will begin to be fully felt, it would seem, only when the European demand shall have slackened or we shall have more than met its requirements. In that case, our exporters would undoubtedly address themselves more systematically and with greater energy to trade regions which our European rivals are now so industriously seeking to control. There is food for thought also in the possible consequences to our European trade of a rivalry on our part which may be so crushing as to greatly impair the purchasing power of those who are now our best customers. If we permanently cripple their chief industries, we deprive them, to a greater or less extent, of the means of buying from us, and the consumption of our food supplies and our raw materials, as well as of our finished goods, may be greatly curtailed. The solution of the problem may perhaps be found in the gradual specialization of commerce and industry, according to the peculiar capacity of each competing nation—the survival, in other words, of the fittest conditions for this or that country—and the gradual subsidence of competition into healthful exchange.

EARLY AMERICAN COMMERCE.

BY W. J. ASHLEY.

[W. J. Ashley, economist; born London, February 25, 1860; graduated from Oxford university; lecturer at Oxford, 1885–8; professor of political economy Toronto university, 1888–92; economic history, Harvard, 1892–1901; since 1901 professor of commerce and public finance and since 1902 dean of the faculty of commerce, University of Birmingham; author of several works on economic subjects and many articles in English and American historical and economic reviews.]

With the impressive rhetoric of which he was a master, Adam Smith, in the very year of the declaration of independence, thus passed judgment upon the system of control which for more than a century England had exercised over the economic activity of her colonies:

To prohibit a great people from making all that they can of every part of their own produce, or from employing their stock and their industry in the way that they judge most advantageous to themselves, is a manifest violation of the most sacred rights of mankind.

Some such opinion has probably been expressed or implied by nearly every writer on the subject from that time to this. A period in which, to begin with, the old colonial system was apparently discredited by its failure, and in which, soon afterwards, all the dominant forces in political society began to tend towards emancipation, towards liberation from restraint, was not an age in which Adam Smith's summary appeal to "the most sacred rights of mankind" was likely to be seriously called in question: nor shall I seek to controvert it to-day. But, starting from such a preconception, it has seemed to many a natural inference,—though, as we shall see, Adam Smith took care not to draw it,—that so seemingly manifest an iniquity must have been actually hurtful to those who were subjected to it; that what was mistaken in principle must have been mischievous in operation. We cannot be surprised that the first generation of American historians should think so; writing, as they did, before the passions provoked by the great struggle had had time to subside. Thus

Bancroft did not hesitate to pronounce "the effects of this system" "baleful"; and he proceeded to justify this statement by an argument which was designed to show that it robbed the colonists in two ways; it compelled them to pay more than their "fair value" for the commodities they imported, and to accept less than their "fair value" for the commodities they sold. But a like opinion is not confined to American historians; it has come to be very generally accepted by English writers; and upon its side it has the authority of the most painstaking and the most widely read of the historians of the eighteenth century—the judicious Mr. Lecky himself. In two well-known passages in his second and fourth volumes, Mr. Lecky leaves no doubt as to his conviction. Though "the country"—i.e., the American colonies—"was," he says, "growing rapidly richer," yet "its progress was seriously retarded," and "many of its natural capacities were paralyzed by law." "It is," he elsewhere remarks, "undoubtedly true that the commercial policy of England had established a real opposition of interest between the mother country and her colonies." If so, it would have demanded an unwholesome degree of patience for the Americans to have submitted with cheerfulness. Commerce must, in the words of Bancroft, have been "converted into a source of rankling hostility"; in the more subdued language of Mr. Lecky, "political alienation" could not have failed to be "the inevitable consequence." Mr. Lecky's philosophy of the American revolution is, therefore, this—though the passage is almost too familiar for quotation:

"If the policy which was the proximate cause of the American revolution was chiefly due to the king and to the landed gentry, the ultimate cause may be mainly traced to the great influence which the commercial classes possessed in British legislation. The expulsion of the French from Canada made it possible for the Americans to dispense with English protection. The commercial restrictions alone made it their interest to do so."

I propose to set forth what seem to me adequate reasons for believing that this view of the case is altogether mistaken; that, whatever may have been the objects it had in view—

and these objects, I shall not attempt to deny, were largely selfish—the policy of England was not, as a matter of fact, economically disadvantageous; that, on the contrary, it was beneficial to the American colonies. Adam Smith's principle of natural rights I shall leave untouched. I shall not even criticise the short and easy syllogism which involves the colonial policy in the same condemnation with mercantilism. Yet I cannot but anticipate that a more accurate knowledge of the facts of the case may put us into a better position to deal fairly even with these ultimate questions of political principle and economic theory.

The laws of England, affecting the trade and industry of the American colonies, fall, with one notable exception to be dealt with by and by, into three groups; and it is essential to bear in mind the differences between them. There were, in the first place, the navigation laws proper; in the second place, what we may conveniently christen the enumeration laws; and, lastly, and as we shall see, of far less significance, the laws concerning manufacture. We will look at them in this order.

I. The act of 1660—directed, as we all know, primarily against the Dutch, who seemed likely to monopolize the carrying trade of the world—enacted that no commodities should be imported into or exported from any British plantation in Asia, Africa, or America, except in British ships. "British," I use for the sake of brevity. The phraseology of the act was more cumbrous; it was, "ships which truly . . . belong only to the people of England or Ireland, Dominion of Wales or town of Berwicke upon Tweede," or "are of the built of, and belonging to any of the said . . . plantations or territories . . . and whereof the master and three-fourths of the mariners at least are English." Students of the history of the period need hardly be told, though the earlier American historians and some English historians have occasionally forgotten, that the word "English" included all subjects of the English crown, and, therefore, the colonists. If there were any doubt, it would be removed by an early act of Charles II. It would be correct, then, to say that by this act a monopoly of the "English" colonial trade was given to "English" ships; but, to avoid ambiguity, it may be well to keep "English" for the island and "British" for the empire.

That this restriction was felt as a grievance at first by the Virginians, who had, for some years past, put large quantities of their tobacco on board Dutch ships, and that it created some annoyance here and there in other colonies, cannot be doubted; just as that other clause of the act which prevented the importation of any commodities into England from other European countries, except in British ships or in ships of the producing country, sent up the cost of freight and caused some temporary irritation among English traders. Adam Smith justly observes that these clauses "were not favorable to foreign commerce, or to the growth of that opulence which can arise from it;" he omitted to explain that this need only be true for a comparatively short period after the passage of the act. We might be content to share his position that, even if the law were economically disadvantageous both to England and the colonies, it was nevertheless wise, on the ground that "defence is of much more importance than opulence." But, for the colonies at any rate, we are not shut up to this non-economic consideration. It is certain that under the operation of the act shipbuilding soon became the chief industry of New England. In less than twenty years New England ships began to be sold in Old England. During the next few decades the business sprang up in every town along the New England coast and in many a riverside village for miles inland. About 1720 Massachusetts alone launched 150 ships a year; and in 1724 the master builders of the Thames complained to parliament that they were seriously injured by colonial competition, and prayed for protection. In view of the language which Franklin got into the habit of using in his later years about "the interest of all America" being "lightly estimated" in England "when the interests of a few of the inhabitants of Great Britain happened to have the smallest competition with it," it may be worth noticing that the request of the Thames shipbuilders was not granted. In New England timber was cheap and easily accessible; and it may be plausibly conjectured that, even without any such protection for colonial built shipping as the act afforded, these advantages would have enabled the colonists after a time to compete with the Dutch, who had to fetch their ship timber from the Baltic. But when we recall Child's lamentations over the inferiority of English ships in point of construction and ease of navigation, and the much lower freight rates which the Dutch were able to offer for this and other reasons, it certainly seems very probable that, but for some such forcible exclusion of foreign ships, the development of New England shipbuilding would have been retarded by half a century or more. Accordingly, the younger generation of American historians are beginning to point out that a much larger place must be assigned to this industry in the economic history of the American people than has hitherto been customary; and, further, to assert, in the words of a Harvard colleague of mine, that "the restriction of trade to English and colonial vessels" actually "stimulated shipbuilding and the shipping interest in the colonies." The complaints of the Virginian planters soon died away. English built and colonial built shipping competed for the privilege of carrying their tobacco, and they were too obviously prosperous to be effective grumblers.

To this immediately economic consideration we may add two others of a mixed political and economic character. The one is that the rapid expansion of American commerce, carried on, as we have seen, largely in American built ships, took place—and under the circumstances of the time could only take place—beneath the protection of the English naval power. To the direct support of this power the colonies contributed only to an inappreciable extent, by grudgingly furnishing a few masts for the navy. This fact can be disregarded only by one who supposes that the colonies could have stood alone, and who does not also remember that colonial hopes and fears contributed in no small degree to involve England in each of the great wars of the period.

The other consideration is that colonial enterprise largely benefited by the opportunities opened to it by the naval successes of the mother country. A recent American historian, unsympathetic towards the colonial system, but acquainted with the details of American business, observes, in passing, that, "Whenever a political change in the foreign relations of England opened a port, or admitted commerce with any country, it quickened the commercial movement along the whole New England line."

II. Now we pass to the enumerating enactments. The statute of 1660 forbade the exportation from the colonies to any country save England and the other plantations of certain enumerated articles—whence the term; namely, ginger, sugar, tobacco, cotton wool, indigo, fustic, and other dyeing goods. The list sounds a formidable one; but the only commodity among them produced in any quantity by the American continental colonies was tobacco, the staple product of Virginia, and later of Maryland also. Rice, which began to be raised in the Carolinas towards the end of the century, was added to the list in 1706, together with the group of articles known as "naval stores;" and copper and beaver skins were inserted in 1722.

None of the staple articles of the trade of New England were ever enumerated during the century 1660–1770—neither fish, nor vessels, nor timber, nor rum; and during the whole of the period before us they could be carried wherever a market might be found.

The historical order of enumeration is also the order of importance; but it will be convenient to take it backwards, and so get the insignificant articles out of our way. By 1722 the fur trade of the English colonies, which had for some time been practically confined to the province of New York, had almost come to an end. For quite sufficient geographical reasons, it had passed into the hands of the French of Canada. The "enumeration" was grumbled at, of course; but it was accompanied by a reduction to one-third of the duties levied on importation into England: and neither restriction nor favor had any substantial effect on a branch of trade bound speedily to disappear. The enumeration of copper was intended for the benefit of the navy. It was suggested by certain wildly exaggerated reports of mineral discoveries; but hardly any copper was mined in America until the present century.

The case of rice calls for more notice. In consequence of its enumeration in 1706, Carolina lost for a time a great part of the Portuguese market, which had been recently carrying off one-fifth of the total output. In 1730, however, the English Parliament so far relaxed the restriction as to allow of rice being shipped directly to any country south of Cape Finisterre. Henceforth, in an average year, Carolina exported some 50,000 barrels. Of these 10,000 went direct to Portugal. Spain and the other Mediterranean countries seem to have been supplied by an inferior Turkish article, while France excluded British rice altogether except on rare occasions. The other 40,000 barrels were taken to England, but only 3,000 of them were there consumed. The rest were re-exported, with a drawback of the duty paid, to Holland and North Germany. The questions raised by this transshipment will be considered in dealing with tobacco. It is evident that during the years 1706 to 1730 the demand for rice was somewhat interfered with; but we may so far anticipate our subsequent argument as to venture the assertion that after that date even complete freedom could hardly have secured a larger European demand than was actually enjoyed.

Naval stores we will postpone till we come to the matter of bounties; and so now we reach tobacco, which was the foundation of the social system of the southern provinces, and formed one-half of all the colonial exports. From 1660 onwards, all the tobacco of Virginia and Maryland sent to Europe had first to be carried to England. But this did not mean that it stayed there. On re-exportation, sometimes the whole, sometimes very nearly the whole, of the import duty was repaid as a "drawback;" and the proportion of the crop re-exported to other European countries was between two-thirds and four-fifths. Thus the enactment, though obviously designed to put profit into the hands of English merchants acting as middlemen, did not by any means shut the American planter out of the European market; at most, it involved some additional freight charges. Even if so,—though the incidence of freight is as tangled a subject as the incidence of taxation,—I imagine the burden would have been borne to some extent by the continental consumer. But, when we see where the foreign market was to be found, we may well doubt whether any cheaper method of doing business with the European continent would have been likely to grow up, even under conditions of absolute liberty. The Mediterranean was supplied with Turkish tobacco; Spain and Portugal only admitted the tobaccos of their own colonies; and accordingly American tobacco could expect to find a market only in northern and central Europe. But, as is remarked in an almost forgotten early work of Lord Brougham, the mother country was constituted by her very situation the natural entrepôt between America and the whole of this area. Brougham's Inquiry into the Colonial Policy of the European Powers appeared in 1803; too early for its criticisms of Adam Smith to secure the attention they deserved. Do not forget that even if American ships could have gone direct to Hamburg, and had been permitted to ship German commodities—which they were not—they would have found it hard to secure a return cargo. Woolen cloth, the chief article imported from Europe, they could not have got more cheaply than in England; for English cloth was at this very time flooding the German market just because it was cheaper. From the French ports, it is true, they might have obtained cheaper silks. But, on the whole, we can have little doubt that the differentiation of employments, by which the planters in Virginia, Maryland, and the Carolinas undertook the production of tobacco and rice, and English merchants found a market for them at home and abroad, was advantageous to both parties. The enumeration probably only hastened the introduction, and somewhat stiffened the outlines, of a method of doing business which would have grown up in any case. As Brougham says, "The restrictive policy . . . only secured, by a superfluous and harmless anxiety, that arrangement which would of itself have taken place, if things had been left to their natural course."

Grant, however, the bare possibility that the interests of the tobacco colonies may have been injured to some trifling extent by the enumeration, we have now to set against it two weighty considerations; first, that from the year 1660 onwards the growth of tobacco in England was absolutely prohibited. The main motive of this measure was probably fiscal; a duty at the ports was easier to collect than an excise. But the act also put forward as a reason the desirability of leaving the business to the colonies. That this was a secondary motive is no reason for doubting that it was a genuine contributory motive. Writers like Bancroft used to ridicule the notion that the suppression of tobacco raising in England could be regarded as in any degree an offset to the enumeration. But, had they lived to know of the modern German crop of tobacco, or had they been acquainted with what was actually going on in the seventeenth century in England, they would hardly have spoken so contemptuously. In fact, the cultivation of tobacco was spreading very rapidly during the protectorate, especially in the west midland counties; and it was put a stop to only by vigorous measures on the part of the executive. And, moreover, as if it were not enough that the Englishman should be prevented from smoking home grown tobacco, grave obstacles were put in the way of his smoking Spanish tobacco. Duties were levied upon it three times as high as upon American; so that the latter almost monopolized the English market. The conclusion is not susceptible of exact proof; but surely there is a high degree of probability in the assertion that a proposal to establish freedom all round would not have been welcome to the Virginian planter.

The vitality of an historical grievance when once it is sent forth into the world is illustrated by the circumstance that even the careful investigator from whom I have drawn many of the foregoing facts is still inclined to think that enumeration contributed, though "but slightly," to the sharp fall in the price of tobacco during the first half of the period before us; the main cause being, evidently, as he points out, overproduction. With this let us compare the diametrically opposite opinion expressed in the Wealth of Nations:

"Had France and all other European countries been at all times allowed a free trade to Maryland and Virginia, the tobacco of those colonies might by this time have come cheaper than it actually does, not only to all those other countries, but likewise to England. The produce of tobacco, in consequence of a market so much more extensive than it has hitherto enjoyed" [we have seen that this is exceedingly dubious], "might, and probably would by this time, have been so much increased as to reduce the profits of a tobacco plantation to their natural level with those of a corn plantation, which it is supposed they are still somewhat above. The price of tobacco might, and probably would by this time, have fallen somewhat lower than it is at present."

The planters had the sense soon to leave off grumbling at the enumeration. If they had continued to be dissatisfied, it would have been but cold comfort they would have got from Adam Smith.

With the enumeration of certain exported commodities, we may conveniently consider the limitation put upon the business of importation into the colonies by a statute of 1663, which enacted that all commodities of the growth or manufacture of Europe should be shipped in England and in British bottoms. The avowed intention was to make England the "staple" for the plantations, and so to secure to English merchants the profits of intermediaries. But, if the preceding argument is sound as to England's position as entrepôt for colonial products, it is equally sound with regard to the supply of European wares. Ships unloading in England and getting a return cargo mainly of English commodities would, economically enough, fill up what space remained in their holds with such European commodities as were in demand. The whole of the English import duty on these commodities was returned as a drawback; and, as the duties imposed by the colonial governments themselves were light, "many different sorts of foreign goods"—it is Adam Smith who assures us—"might have been bought cheaper in the plantations than in the mother country." So far was the English government from pursuing, in this matter, either its fiscal interest or the immediate advantage of Englishmen, that the same great writer actually criticises its policy on the ground that it was likely to be injurious to both. Thus he remarks:

"The mother country might frequently suffer, both in her revenue, by giving back a great part of the duties which had been paid upon the importation of such goods, and in her manufactures, by being undersold in the colony market in consequence of the easy terms upon which foreign manufactures could be carried thither by means of these drawbacks."

And he gives a specific example:

"The progress of the linen manufacture of Great Britain, it is commonly said, has been a good deal retarded by the drawbacks upon the re-exportation of German linen to the American colonies."

III. The third class of restrictions, those upon manufactures, have lent themselves even more easily to rhetorical denunciation, though their effect, I believe, was altogether insignificant. Let us see, first, exactly what they were, and notice the dates in each instance. There were just three cases. In 1699 it was enacted that no wool, yarn, or woolen cloth produced in the English plantations should be "loaden or laid on board in any ship or vessel; or loaden upon any horse, cart, or other carriage, to the intent and purpose to be exported, transported, carried, or conveyed out of the said English plantations to any other of the said plantations, or to any other place whatsoever." The object was to prevent all manufacture for a distant market, while not interfering with manufacture within the family, or for purely local needs. In 1732 it was enacted that no hats should be exported to England, Europe, or other colonies; manufacture for sale within each particular colony was again left free, except that it was now placed under the same rules of apprenticeship as English hatters were subject to, under the statute of Elizabeth. Finally, in 1750—almost at the end of the period—it was enacted that no steel furnaces or slit mills should be erected in the colony, the country forges which made bolts and nails and common farm implements remaining untouched.

We are not now engaged in passing judgment on the motives of the framers of these acts, or of the English manufacturers who petitioned for them. Our sole task is to determine what significance, if any, they possess in the economic development of America. Two questions at once occur; to what extent had the industries in question been actually set on foot before the acts? and how far were the acts obeyed? Unfortunately, our evidence is conflicting. The great woolen interest of England, which supplied more than half the exports to the colonies, was easily alarmed. The idea soon gained currency that the way to prevent the colonists from interfering with the vent of English cloth was to turn their attention towards the production of naval stores. Thereupon, all those persons in England and America who anticipated some advantage to themselves if the government would only subsidize the production of naval stores, were tempted to join in the cry of danger. Governors' reports are hardly more trustworthy; they often know but little of their provinces outside the chief towns; and either they wanted to insure the vote of their salaries by keeping on good terms with their assemblies, and were therefore inclined to pooh-pooh English alarms, or they were at feud with their assemblies and saw everything colonial through clouded spectacles. So, as "the historical method" is risky here by itself, let us have recourse to a little "deduction" from the principle of self-interest. There is a celebrated pamphlet, known as The Canada Pamphlet, which Benjamin Franklin wrote in 1760, when he wanted to persuade the English public that it would be better to retain Canada than Guadaloupe among the spoils of war. In this he roundly asserted that hitherto the English manufacturers' monopoly of the colonial market had not been seriously threatened, since

"No man who can have a piece of land of his own, sufficient by his labor to subsist his family in plenty, is poor enough to be a manufacturer and work for a master. Hence, while there is land enough in America for our people, there can never be manufactures to any amount or value."

And again:

"Pennsylvania is the colony the most suspected of carrying on manufactures, on account of the number of German artisans who are known to have transplanted themselves into that country, though even these, in truth, when they come there, generally apply themselves to agriculture as the surest support and most advantageous employment."

And once more:

"The colonies are so little suited for the establishing of manufactures that they are continually losing the few branches they accidentally gain. The working braziers, cutlers, and pewterers, as well as hatters, who have happened to go over from time to time and settle in the colonies, gradually drop the working part of their business, and import their respective goods from England, whence they can have them cheaper and better than they can make them. They continue their shops, indeed, in the same way of dealing; but become sellers of braziery, cutlery, pewter, hats, etc., brought from England, instead of being makers of those goods."

It will have been noticed that Franklin, like other economic writers, passes unconsciously to and fro between deductive argument and historical statement. He not only argues that the inhabitants of the colonies would follow their self-interest, and therefore pursue agriculture rather than manufactures; he asserts that as a matter of fact that is what they did. As a man of the people and as agent for Pennsylvania, Franklin must have been acquainted with the facts. A few years later, indeed, he was writing pamphlets which gave at any rate a different impression; but we can hardly think so meanly of him as to suppose this argument of 1760 an altogether baseless invention.

Adam Smith had probably read or heard about this pamphlet. At any rate, it is exactly in the same strain that he expresses himself. In one place he asserts that

"In our North American colonies, where uncultivated land is still to be had upon easy terms, no manufactures for distant sale have ever yet been established in any of their towns. When an artificer has acquired a little more stock than is necessary for carrying on his own business in supplying the neighboring country, he does not, in North America, attempt to establish with it a manufacture for more distant sale, but employs it in the purchase and improvement of uncultivated land. From artificer he becomes planter; and neither the large wages nor the easy subsistence which that country affords to artificers can bribe him rather to work for other people than for himself. He feels that an artificer is the servant of his customers, from whom he derives his subsistence; but that a planter who cultivates his own land and derives his necessary subsistence from the labor of his own family is really a master, and independent of all the world."

The other passage comes to the same conclusion for a different reason. Immediately after the remarks about the "sacred rights of mankind" already quoted, he continues thus: "Unjust, however, as such prohibitions may be they have not hitherto been very hurtful to the colonies." Readers unacquainted with Adam Smith's modes of thought may not suspect that "not very hurtful" is his Scotch, cautious way of saying "not hurtful at all." For he goes on:

"Land is still so cheap, and, consequently, labor so dear among them, that they can import from the mother country almost all the more refined or more advanced manufactures cheaper than they could make them for themselves. Though they had not, therefore, been prohibited from establishing such manufactures, yet, in their present state of improvement, a regard to their own interest would probably have prevented them from doing so . . . . These prohibitions, perhaps, without cramping their industry or restraining it from any employment to which it would have gone of its own accord, are only impertinent badges of slavery imposed upon them, without any sufficient reason, by the groundless jealousy of the merchants and manufacturers of the mother country."

This is a passage which heightens one's respect for Adam Smith. He is so bent upon crying, "Edward! chains and slavery!" And yet he has the scientific conscience.

When now we come to look into the evidence concerning the particular industries, it is found to harmonize pretty well with the conclusions of Franklin and Smith. In the southern colonies no manufactures were ever attempted, except the production of pig iron; the commonest and cheapest articles of daily use were all imported from the old country. It was Pennsylvania, New York, and New England which aroused the jealous fears of English merchants and artisans. The climate of New England is not at all suitable for sheep breeding, and the transportation of wool from the middle colonies was expensive. Nevertheless, both in New England and in the middle colonies, some attempts were made here and there by small capitalists to play the part of English clothiers. This was in the closing years of the seventeenth century and the opening years of the eighteenth. They soon abandoned the business; not on account of the prohibition, but because the conditions became more favorable for other investments. The colonies evidently had had some difficulty at first in obtaining "returns," to use the language of the period, for the goods they wished to import; and for a time they had, perhaps, to go rather short of the finer fabrics. But in the years of peace which followed the great settlement at Utrecht, in 1715, what with the rapid growth of the shipbuilding business and of the fisheries, the opening up of a new trade with the West Indies, and the extension of the two allied occupations of rum distilling and slave trading, this difficulty quickly disappeared; and the capitalists of the towns found remunerative opportunities for investment. As to the country weaver, who might conceivably have grown into something like the west of England clothier, Adam Smith's remark that he would be far more likely to put his savings into land is true enough, and very pertinent. Accordingly, the state of affairs in the period 1715–60 was somewhat like this: the farmers' wives and daughters themselves spun the wool which they got from their own few sheep; many farm houses had their own looms where, if the farmer or his servants were without the necessary skill or time, an itinerant weaver worked up the yarn into cloth; and then the farmer put a bundle of this cloth into his buggy and drove over to a neighboring fulling mill. If he was too poor to own a loom, he took his yarn to a weaver's cottage in the next village. Meanwhile the townspeople were all clad in English manufactures; the merchants and professional men liked them better, and, as all the towns were on the coast, the working classes got English stuffs more cheaply than they could have bought up-country woolens. Probably Emerson's "embattled farmers,"

"Who fired the shot heard round the world,"

were clad in American homespun; but it is more certain that Adams and Otis and Franklin wore English broadcloth. And so, "in general, the act of parliament was well obeyed, since it carried no hardship with it in the eighteenth century." It is an American economic historian from whom I quote.

The law of 1732 as to hats was the result of the alarm of the London company of hatters, who saw in their mind's eye thousands of American hats being shipped to England. There is a paper drawn up by Franklin in London at the end of 1767, in which he endeavors, as he puts it, to "palliate" certain recent proceedings in Boston which, he confesses, gave him "great concern," by a sympathetic account of what he alleges to be the American frame of mind. He represents the Americans as arguing that "there cannot be a stronger natural right than that of a man's making the best profit he can of the natural produce of his lands;" that "beaver furs are the natural produce of that country;" and "yet the hatters of England have prevailed to obtain an act in their own favor, restraining the manufacture of hats in America." This argument as to the natural right of a people to work up their own produce has been echoed by Bancroft and Mr. Lecky, and it is very telling; but they have taken Franklin too much au sérieux. He was careful, we may observe, not to commit himself. The argument is given in oblique oration; and Franklin hedges at the end by the ironical comment, "These are the wild ravings of the half distracted Americans." I gravely doubt whether, as a matter of fact, the "half distracted" Americans were "raving" to this effect. The argument is quite inconsistent with what we have already learnt as to the decay of the fur trade in the English colonies. And the truer impression is certainly that which Franklin himself gives in his pamphlet of 1760, before cited, that the hat making industry had been brought to an end not by the pressure of law, but by economic causes.

"It is true [Franklin then said] there have been, ever since the first settlement, a few hatters in New England, drawn thither probably at first by the facility of getting beaver while the woods were but little cleared and there was plenty of those animals. The case is greatly altered now. The beaver skins are not now to be had in New England, but from very remote places and at great prices. The trade is accordingly declining there; so that, far from being able to make hats in any quantity for exportation, they cannot supply their home demand; and it is well known that some thousand dozens are sent thither yearly from London, Bristol, and Liverpool, and sold cheaper than the inhabitants can make them."

Finally, we come to the iron industry. The statute of 1750 enacted that no mill or other engine for rolling or slitting iron, no plating forge to work with a tilt hammer, nor any furnace for making steel, should be erected in the colonies. This, I confess at once, is the one weak point in my argument. There were, perhaps, at this date, some half dozen slitting mills in New England, and possibly two or three tilt hammers and two or three steel furnaces. It cannot be denied that they would probably have enjoyed a certain moderate prosperity, and that they could readily get all the iron they needed from the southern colonies. Moreover, the act did cause them to be shut up. It can only be pleaded that, after all, it was not a large matter; and one might perhaps make something out of the fact that the owner of one of the largest of the slitting mills, so far from never getting over his grudge, was conspicuous a few years later as one of the leaders of the Loyalists. Yet there is another side to the account, which, if it does not balance it, ought not to be quite forgotten. The same act favored American bar iron and pig iron by removing the duties to which they had hitherto been subject on importation to England, while leaving intact those on Swedish and other foreign iron. This was done for immediate political motives, in the hope of rendering England independent of foreign sources of supply; and also for mercantilist motives, to check the supposed drain of specie. But to the credit of the government it may be remarked that the concession was granted in the teeth of much opposition from English iron masters and owners of woodlands, and even from farmers. The consequence of the removal of the duties was that in four years the quantity of colonial pig iron imported into England increased by one-half; and that it began, for the first time, to be profitable to carry over bar iron. But, unfortunately, while it was New England which chiefly suffered from the new restriction, it was Virginia and Maryland which profited by the new favor.

With the exception still to be dealt with, we have now come to the end of all the possible grievances; and we have seen how slender are the grounds for supposing that the measures in question did, to any notable extent, inflict real injury on the American colonies. But, as we have already seen in the case of iron, the action of the English government was not always of a restrictive character: it sometimes took the form of encouragement; and these two elements in English policy cannot be separated. Because it restricted, it felt bound to encourage; because it encouraged, it felt the more justified in restricting. This is strikingly illustrated by the efforts to promote the production of "naval stores,"—of tar and pitch, of masts and hemp. These were enumerated in 1706; and, if the restriction had stood by itself, the colonies might conceivably, though this is very doubtful, have lost some small foreign sale for their masts. The other enumerated stores were not produced at that time in America of sufficiently good quality to attract a foreign demand. But in 1705 the English government definitely adopted the policy of offering a considerable bounty on the importation into England of all of these stores from the colonies; and, with but slight interruption, this policy was followed down to the end of the colonial period. One estimate makes the amount thus paid more than a million and a half pounds. Of course, the purpose of the government was not primarily the welfare of the colonies. It desired: (1) to make the British empire independent of foreign sources of supply for what were really munitions of war; (2) to circumvent the Stockholm Tar company, which had obtained a monopoly of Baltic pitch and tar, had put up prices, and had excluded English ships from the trade; (3) to prevent a supposed drain of specie from England; and (4) to enable the colonies to provide themselves with "returns," so that they should not be tempted to manufacture for themselves. But, after all, it did honestly and with reason believe that the industries in question were suited to America. It did take a world of trouble about investigating the whole subject, and about teaching the colonials better methods of preparing their tar—how much trouble the recent monograph of Miss Lord of Bryn Mawr college, based upon unprinted English state papers, has recently made clear to us, and, finally, it did meet with a fair measure of success. The bounties on hemp and on masts had little effect, but the production of pitch and tar throve exceedingly. In 1704 nearly

43,000 barrels of pitch and tar were imported into England from Sweden, something like 18,000 from the rest of Europe, and only 872 from the plantations. In 1718 the Swedish product was dispensed with, the supply from the rest of Europe had fallen to 10,000, that from the plantations had risen to 82,000 barrels. After that the increase was slower, but it did not cease. In 1770 the figures were, for pitch and tar, 103,000, together with 41,000 barrels of turpentine. The colonies which profited the most were the Carolinas, with their great pine forests. The industry was thoroughly suited to the physical conditions of the country; but it could not have maintained itself without some such assistance against the competition of Sweden; as was at once apparent when the bounties were temporarily withdrawn. Adam Smith remarks that the joint effect of the enumeration and of the bounties was to "encourage the clearing of land" in America, which he regarded as the great prerequisite to improvement. How far this may be true I should not like to say; but I may perhaps observe that, besides its effect on the Carolinas, the bounty policy must indirectly have benefited New England. Cheap tar must have contributed to the prosperity of shipbuilding and the commerce dependent upon it. I hasten to add, lest my orthodoxy should be suspected, that no general economic argument on behalf of bounties can be drawn from this experiment, since it was America that benefited and England that paid the price.

I have postponed to the end the one great exception, the one act which was altogether and unmistakably ill advised, the one act which, had it been enforced, would have hampered American trade, or rather would have thrown it into complete confusion. This was the "molasses act" of 1733. By this act duties were imposed on the importation of sugar, molasses, and rum from foreign plantations—i.e., from the foreign, and especially the French, West Indies—into any of the British colonies; duties high enough to be, and intended to be, prohibitory. But the act was easily evaded with the connivance of the customs officers, and no serious attempt was made to enforce it throughout our period. When a little later it did become a practical grievance, it was as part of a quite new policy, which aimed, primarily, not at controlling trade, but at securing revenue.

The statement that the enforcement of the molasses act would have been disastrous calls for some explanation. New England, as we have seen, imported very largely fine manufactured goods from England. For these it had little of its own to send in exchange, but it could get molasses very cheaply from the French West Indies—more cheaply than from the English, because the French islands could produce sugar at a lower cost; and, as they were prohibited from importing rum into France, they had their molasses left on their hands. As a pamphleteer naïvely puts it, "Molasses was of little or no value to the French planter, because rum was detrimental to France, as interfering with the consumption of their brandy." The molasses was converted into rum in the "still houses," which sprang up from 1720 onwards in great numbers in New England. The most thriving center was Newport in Rhode Island, which had twenty-two distilleries. The rum was consumed in large quantities by the people of the New England states, especially by those engaged in the fisheries, to mitigate the hardships of their life; it was freely employed in barter with the Indians; but the larger part of the demand for it arose in connection with the slave trade. For thirty years Rhode Island sent some eighteen vessels annually to the slave coast, carrying 1,800 hogsheads of rum; and Massachusetts was not far behind. The "rum men," as the New England slavers were called, found that "a prime man slave" could be bought for about 110 gallons. An employer at home, in one case at least, instructed them: "Water your rum as much as possible, and sell as much by the short measure as you can." The West Indies and, increasingly as the century went on, Virginia and Maryland readily bought the black cargoes, and paid either in specie or in bills drawn upon tobacco exported to England. With these New England could pay its debts to the English manufacturer, and so "the circle of commerce" was complete. With justice did the Americans complain that to enforce the molasses act would cut the ground from beneath their feet. As it was not enforced, any further observations are perhaps superfluous. Yet observe that this one act, which, if enforced, would have had an effect on the course of affairs, was not passed to satisfy the clamors of any protected English interest, and cannot even be construed as a corollary of the mercantile theory of the balance of trade. It was passed for the sole benefit of other American colonies, though these were insular and not continental. By the strange irony of history, it was passed, we learn at last, mainly "at the instance of a Boston merchant who was interested in sugar growing in the British West Indies."

Our survey of English commercial legislation and of its probable effect, or, rather, absence of effect, upon the American colonies, is now complete. But a moment's reflection will show that the larger question of the effect upon the economic development of the colonies of their connection with the mother country cannot be answered from a consideration of the legislation alone. There were other large forces at work outside and independent of all legislation. I can only touch on one of them. In his celebrated speech on American taxation, delivered in 1774, Edmund Burke, after noticing that the Americans had tolerated the system of commercial restraint, proceeds to give this explanation:

"They were indemnified for it by a pecuniary compensation. Their monopolist happened to be one of the richest men in the world. By his immense capital (primarily employed not for their benefit, but his own) they were enabled to proceed with their fisheries, their agriculture, their shipbuilding (and their trade, too, within the limits), in such a manner as got far the start of the slow, languid operations of unassisted nature. This capital was a hotbed to them. Nothing in the history of mankind is like their progress."

Evidence of English capital in American business meets us, indeed, at every turn. Thus an estimate of the year 1731 places the value of "the tobacco ships alone" at £240,000, "the greater part thereof, by far, being English built, continually and constantly refitted and repaired in England." On this point Adam Smith agrees with Burke. In that Book III. of his treatise which is so little read, he remarks that "the progress of our North American and West Indian colonies

CONCORDIA COLLEGE LIBRARY
BRONXVILLE, N. Y. 10708

would have been much less rapid, had no capital but what belonged to themselves been employed in exporting their surplus produce." And, when we turn to his set argument against the colonial system, we find that his main position is not that it was bad for the colonies, but that it was bad for England, in that it sent into the direction of the colonial trade an undue proportion of her capital. This may or may not be true; but that it did attract a great deal of English capital can hardly be doubted. And, although the case is somewhat different to-day, as American railways and Argentina sufficiently demonstrate, undoubtedly in the eighteenth century capital to a very large extent followed the flag.

The English commercial legislation, I conclude, did the colonies no harm prior to 1760; and the English connection did them much good. Under these circumstances, it is no wonder the Americans were neither indignant nor restive. I know of no evidence, during the century under review, for Bancroft's "rankling hostility" or for Mr. Lecky's "political alienation" as "the inevitable consequence." Individuals here and there felt themselves hampered in their operations, and were naturally annoyed; but there is absolutely no evidence of any widespread irritation. When one reads Mr. Lecky, one thinks of a movement of popular thought comparable to the opposition to Laud's ecclesiastical policy or to the agitation which led to the great reform bill. But, when one comes to look into the American sources, one has to search very minutely indeed to find any reference to the restriction at all. The lawlessness produced by the half smuggling molasses business did, in a sense, contribute to the revolution, but it was a very minor element among many others: to be put by the side of the irritation of the New Hampshire backwoodsmen at the attempts to enforce the claims of the crown to masts for the navy; to be put much below in importance the alarm which New England puritanism felt before the anticipated inroads of the English church. So far as I can see, the trade grievance was first formulated by Franklin. But the pamphlet in which he did so, that of 1767, already quoted, was hardly expected to be taken seriously; and even there the economic grievance was put on a level with grievances of another kind. It was not till some years after the conflict had begun, when imagination was already playing tricks with memory, that the commercial restrictions were put in the foreground and represented as positively oppressive.

The final assertion of Mr. Lecky that "the commercial restrictions made it to the interest of the Americans to dispense with English protection," you will have already gathered, is quite unsupported by evidence. A careful historian, Professor Moses Coit Tyler, of Cornell, has said in print what has long been known, that "probably a vast majority of those who stood for the commercial interests and for the capital of the country" were opposed to the revolution. After the war was over, the economic condition of the country remained almost stagnant, if it did not retrograde: no more trade sprung up than before between the several states; no more manufactures were set on foot. Economically, the colonial period ends not with 1776 or 1789, but with the embargo of 1808, which brought entirely new forces into operation.

Holding as I do a professorship in an American university, it may perhaps have seemed somewhat ungracious on my part to destroy what is often regarded as part of the American case for the revolution; but I am in excellent American company. The last ten years have seen the establishment of the first really critical school of American historians; and the outspokenness with which they have assailed some widespread historical superstitions does honor to their impartiality. In this particular matter the first distinct note of dissatisfaction with the current opinion was, I believe, struck in 1888 by that very competent Massachusetts antiquary, Judge Mellen Chamberlain. He has been followed by many of these younger scholars who are now being put in charge of departments of American history at the larger universities. It is very significant that in his Student's History of the United States, which seems likely to become a widely used text book in the best high schools of the country, Professor Channing does not hesitate to lay down that "it is impossible to say that the system was to the disadvantage of the colonists." The work of such men evidently tends to promote a kindlier feeling between America and England; for, while they leave untouched the great principle of no taxation without representation, they remove the notion which has naturally created soreness, that for a century England was inflicting an actual injury upon the American colonies. It may be that the objects of the legislation must still be regarded as preponderatingly selfish, though as to that some qualification and charitable explanation will probably be necessary: it is a great thing to realize that no harm was done. I have but summarized some of this recent historical work and arranged in order the conclusions to which it points; and for this reason. In the utterances of Englishmen concerning America, I do not know which has done more harm—an ignorant contempt, unjust to America, or an ignorant sympathy, unjust to England. The latter is now, perhaps, the more common. Yet I cannot but hope that the efforts of American scholars to spread among their own people more accurate views of their past will not be impeded much longer by extravagant assertions on the part of Englishmen.

THE BEGINNING OF AMERICA'S FOREIGN TRADE.

BY WORTHY P. STERNS.

[Worthy P. Sterns, economist; has specialized in the study of the foreign commerce of the United States, much of his work having been done while he was a graduate student at the University of Chicago; he has contributed articles on the commerce of the nation chiefly from a historical standpoint to the principal economic journals.]

Copyright 1903 by The University of Chicago

In 1820 there were about ten million people in the United States. One fourth of this number had already found homes west of the Alleghanies, one fourth lived on the Atlantic slope south of the Potomac, a sixth in New England and a third between New England and the Potomac. The density of population in New England was one half greater than that in the central section, three times that in the south, and five times that in the west. The total area then occupied was a little over half a million square miles; the average density of population a little less than twenty to the square mile. The proportionate area of occupied territory in each section was, approximately, in the ratio of one in New England, three in the middle section, four in the southern, and six in the western.

In New England, 172 persons out of every 1,000 were engaged in agriculture, 15 in commerce and 51 in manufacture. Of every 1,000 people in the middle states, 163 were occupied on the farms and only 7 in trade, or less than one half the relative number so engaged among their neighbors on the north. Fifty out of every 1,000 in the middle states were at work in shops and factories, and of all those engaged in the textile and iron industries of the United States, probably one half resided in this section. The South Atlantic states enrolled 381 out of every 3,000 as engaged in agriculture, 4 in commerce, and 21 in manufacture. The presence of the slave is shown by the relative number of agricultural laborers exceeding that in the northern states by over one half.

In the west the preponderance of agricultural labor was not quite so striking, though the slave holding states of the

Mississippi valley have been included in this section. The returns show 245 of every 1,000 as occupied on the farms, 6 in commerce and 24 in the factories. Even the small number 6 gives an exaggerated idea of the importance of commerce in that part of the country. If Louisiana is excluded from this section we find that only 3 in every 1,000 of its population were engaged in trade. How largely the west depended upon its navigable rivers for transportation and to what an extent its trade centered in New Orleans is shown by the fact that 41 out of every 1,000 of the people of Louisiana were engaged in commerce. Measured by this standard the importance of commerce was 50 per cent greater to Louisiana than to Massachusetts, and its importance to Massachusetts was twice as great as to any third state.

Heavy freight wagons had, to a large extent, taken the place of the pack horses of half a century earlier, but the canal was for the most part, and the railroad altogether, a thing of the future. By pack horse in 1784 it cost $249 to carry a ton of freight from Philadelphia to Erie, and as late as 1821, so high a rate as $11 a hundredweight was paid for freight from Philadelphia to Pittsburg. A report to the legislature of New York, dated March 17, 1817, gives some conception of conditions prevailing before the building of the Erie canal. "The expense of transportation from Buffalo to New York was stated at $100 per ton . . . . , the cost of transportation equaled nearly three times the market value of wheat in New York; six times the value of oats; and far exceeded the value of cured provisions." Freights down the river to New Orleans were much less. A rate of $1.50 a barrel for flour from Louisville to New Orleans was made as early as 1814. The rate up the river was over $100 a ton up to 1819. Niles mentions the fact that so low a rate as $37.50 a ton on freight from New York to Buffalo, was made in 1820. But that this was very exceptional is proved by the seaboard and Pittsburg prices for bar iron in that year. The seaboard prices were from $90 to $100 a ton, the Pittsburg prices $190 to $200, the Cincinnati price about $220.

Under such conditions of transportation the economic isolation of the people west of the Appalachians is hard to realize. One who knew it by experience said: "Under such disadvantages the commerce of the country was nominal, and nothing but necessity prompted the inhabitants to engage in it. The farmer had no motive to increase the product of his fields beyond the wants of his family and of immigrants or 'new comers,' as they were called, who might settle in his immediate neighborhood. For many years these immigrants created the only demand which existed in the interior settlements for the surplus products of agriculture." The people on the Atlantic were not so cut off from each other, and over three-eighths of our merchant marine was devoted to the coasting trade. The economy of this means of transportation is indicated by the bulky and heavy character of some of the goods taken from the northeastern states to New Orleans. Among other articles may be noted lumber, bricks, building stone, lime, hay, oats, candles, soap, cider, salted fish, potatoes, furniture, carriages, etc.

In the calendar year 1820 the imports of European manufacture retained for home consumption did not amount to $20,000,000. Four years before, in the fiscal year 1816, they had amounted to nearly $100,000,000. The average American had decreased his annual purchases of such commodities from twelve dollars to two dollars. The inability to pay for a larger supply was undoubtedly the cause of this economy. Industrial efficiency had not advanced sufficiently in the United States to enable the people to satisfy most of their own wants. Their inability, because of the economic, industrial, or political conditions of the period, to supply the wants of other countries made it necessary that many of their wants should go unsatisfied. That these conditions, as a whole, should be so unfavorable naturally occasions some surprise. There were more lands opened for cultivation than ever before. The number of those able to work had never been so large. The mechanical contrivances for making the work effective had never been so numerous. Competent men, at the time, were of the opinion that there was as much specie in the country as there had ever been. The industry of the country had not been embarrassed by the withdrawal of foreign capital, as the total investments of such capital in this country were insignificant in amount. All these conditions seemed favorable to prosperity, yet the country was in a state of economic collapse, of which one of the most striking features was the great decline in foreign trade.

What advantages possessed by the country during former periods of prosperity and foreign trade activity had been lost? In the early years of the century the Napoleonic wars had given her special advantages as a carrier of ocean freights, and had also, at times, created enough of a demand for breadstuffs to render their exportation from the United States profitable. These two means of payment enabled the country to import European commodities in considerable quantities for several years. The coming of peace and the establishment of discriminating duties in many countries materially changed these conditions. The relative superiority of our merchant marine, though based on unquestioned excellence of seamanship and unequaled supplies of shipbuilding material, was largely counteracted by the effects of the hostile tariff legislation of Europe.

Following the loss of these advantages, there appeared, during the years 1815–1818, an extraordinary resort to credit in our foreign trade. The excess of imports over exports in 1816–1818 amounted to $100,000,000. Niles was of the opinion that a similar amount due on foreign accounts was defaulted between 1815 and 1820. It is hardly necessary to say that, with such evidence as this of the lack of financial integrity in the country, European nations would for many years hesitate to send to the United States cargoes greatly exceeding in value those received in return.

The United States was not disposed to sit silent under the restrictions placed upon her merchant marine by foreign legislation. For twenty-five years this marine had constituted the most important factor in the growth of national wealth. It is true that the tariff act passed by the first congress was intended to develop our domestic manufactures. Men at that time, however, had no conception of the intensity of the commercial and industrial rivalry which was to result from the introduction of the machine and the factory. It is probable that the duties levied would have been entirely insufficient to counteract Europe's advantages in larger capital and cheaper labor, even under the ordinary conditions of the period. Certainly they must have been very much higher to divert capital and energy to domestic manufactures in view of the abnormal profits which the Napoleonic wars brought to the American carrying trade. They enjoyed almost a monopoly as neutral carriers during this period. It was hard to make a venture so rash that it would involve loss. Wealth was accumulated in New England with wonderful rapidity, and the people there naturally came to believe that the welfare of the nation was bound up in the preservation of its foreign commerce. Even national pride and honor became a secondary consideration, and it is probable that war would not have been declared in 1812 had it not been for the aggressive spirit of the west, which at that time first found expression in the national councils.

At the close of the war conditions became normal, or at least such as are characteristic of extended peace. Europe declared her independence of American breadstuffs and shipping, and proceeded to enforce that declaration. Congress recognized the need of immediate action, and in 1818 passed an act offering reciprocity in navigation to other countries. These terms were accepted voluntarily by some countries and by others under compulsion of the legislative reprisals in the navigation laws of 1818 and 1820. Much of the relative economic superiority naturally belonging to our merchant marine was thus restored, and for several decades its services constituted a considerable part of our payments for foreign commodities.

But if an agricultural nation is to carry on any considerable commerce with the outside world it must necessarily involve the exportation of farm products; and we naturally turn to consider whether conditions were such as to encourage farmers in the United States to attempt to supply the world market. As a rule the cost of transportation of farm produce from any distance to the seaboard was greater than the value of the produce when delivered. Robert Fulton, at an early day, enumerated the following products of the interior of the country, "wheat, flour, oats, barley, beans, grain, and pulse of all kinds, cider, apples, and fruit of all kinds, salt, salted beef, pork, and other meats, hides, tallow, beeswax, cast and forged iron, pot and pearl ashes, tanner's bark, tar, pitch, rosin, and turpentine, hemp, flax, and wool, plaster of paris, ... marble, lime, and timber." He states that none of these articles could pay transportation bills of five dollars per hundredweight. One might draw up a much longer list of the products of the Mississippi valley in 1820, but the cost of transportation as indicated by data already given was still five dollars per hundredweight from Buffalo to New York city.

The heavy cost of transportation was no less effective in increasing the expense for commodities consumed by the farmer than it was in reducing the return for his products. Foreign countries were allowing drawbacks and paying premiums and bounties on exports to the United States to such an extent that their wares were selling in our seaports at prices even below their first cost, if we can trust a numerous array of witnesses. Yet in spite of this fact, the farmer who brought his products to Pittsburg had to give a bushel and a half of wheat for a pound of coffee; a barrel of flour for a pound of tea; and twelve and a half barrels for one yard of superfine broadcloth. That the farmer had any produce left to exchange for these foreign goods seems remarkable when we consider that in parts of Ohio he must give four bushels of wheat for a yard of domestic cassinet and twenty for a pair of boots. It was reported that in Kentucky wheat sold for twenty cents and corn for ten cents in specie. It has already been noticed that the products of the western farm could at no time pay the expense of transportation to the eastern market, and as late as 1820 flour manufactured from grain grown in central Pennsylvania netted the producers only $1.25 per barrel when marketed in Baltimore. The development of steamboat transportation on the Mississippi and Ohio gave the farmers near those rivers, at times when circumstances were most favorable, a profitable market in New Orleans. In January 1820 fresh beef from Kentucky was sold in the southern market. In that year, it is said, there were already seventy-two steamers on the western rivers. The result of this increase in the means of transportation was shown in heavy shipments from the north, the sales of which failed to pay the expenses of transportation.

The handicap on the farmers of the interior was increased by the position of the southern cotton planters. Their plantations, up to 1820, were so near to tide water that transportation constituted only a small part of the expense of production. The steadily increasing European demand for cotton, while beneficial to the cotton planter, had a disastrous effect on the market for northern farm and factory products in the south. The cotton ships on their return from Europe carried freight at the very lowest rates in preference to sailing in ballast. This enabled the French farmer and manufacturer even of bulky commodities to meet the American producer in successful competition in the New Orleans market. The list of French commodities on sale there in 1819 included among others such articles as sausages, butter, cheese, bricks, tile, hollow cast iron, etc. Moreover, the tariff legislation of Europe was far more successful against our farm products than when turned upon our merchant marine. The flour which in 1820 netted the producers but $1.25 per barrel in Baltimore paid into the treasury of Spain a revenue of three times that amount if exported to Cuba. This is a fair example of the tariff during that period on nearly all food products of the temperate zone which sought a market in foreign ports.

A third, and probably more important hindrance to the development of an export trade in agricultural products was to be found in the character of the people themselves. Their sanguine disposition, their fondness for speculation, in short their overweening desire to get something for nothing was already exhibiting disastrous results. On every side in stay laws, exemption laws, and sheriff's sales, the story is plainly told that the term agricultural industry had not been used to indicate plodding effort devoted to the production of foods for the world market. Farmers undoubtedly gave a part of their time to supplying the demands of the market, but it would seem that they depended for most of their expenditures upon the more exciting occupation of "buying land cheap and selling it dear." This pursuit had been followed with eminent success during the boom that lasted from 1815 to 1819. Now the tables had turned and for years to come a desperate struggle was to be carried on in maintaining the fictitious values created by speculation. The passage of unconstitutional laws in favor of the debtor, the subversion of the courts when they failed to sustain such laws, the establishment of a state bank for the special purpose of making loans to owners of mortgaged lands the sale of its notes when issued at a discount of 30 per cent—such is the record which is literally true for the state of Kentucky alone, but which is a fair type of the procedure in all those states where new lands were coming rapidly into cultivation.

Evidently the United States could not look forward to any considerable exportation of the food products of the interior until the expenses of transportation should be greatly decreased, the tariff restrictions on their importation into foreign countries in some degree relaxed, and the over-capitalization of its farm lands much reduced. These hindrances to economic prosperity confronted over half the population of the country, and it is worth while to consider by what methods and in what spirit they were met.

The American pioneer was indeed fond of speculative gains, but this was by no means his only striking characteristic. His fondness for economic independence and for enterprises in which his own will furnished the initiative to every application of effort, affords us the only satisfactory explanation of his chosen mode of life. What that life involved in many cases is vividly portrayed in the words with which John Randolph sought to characterize the supporters of the tariff act of 1824. He said: "Men in hunting shirts, with deerskin leggings, and moccasins on their feet want protection for manufactures—men with rifles on their shoulders and long knives in their belts, seeking in the forests to lay in their next winter's supply of bear meat." Such men as these and the descendants of such men had gradually pushed the frontier of American settlements from the Atlantic seaboard far out into the central valley of the continent. When the difficulties of transportation are taken into consideration it is correct to say that already half the people of the country were living at a considerable distance from the sea. The progress they had made in the economic subjugation of the domain into which they had entered was remarkable. It is a matter of no surprise that the American characteristics of self-dependence and self-confidence found their earliest and fullest development and expression under such circumstances. It is true that they had no direct interest in the earnings of the merchant vessels of New England, yet one cannot doubt that it was the presence of a national spirit, too strong to submit to what they considered intolerable aggression and unjustifiable breaches of faith on the part of England, that caused them to force the country into the war of 1812. If the economic risk to themselves had been as great as it was to New England, they would have pursued the same course.

These men already felt that the economic interests of the country should be considered as a unit. They had an unquestioning and almost boundless faith in the future wealth of the territory in which they lived, but nothing approaching its immediate realization could be attained by them without the aid of the accumulated capital of the eastern seaboard. Their only hope for the common comforts of civilization lay in bringing the consumer and producer nearer together. If American capital and enterprise could be persuaded to flow inward instead of outward, to apply itself to inland transportation and manufactures instead of foreign commerce, they had the fullest confidence that our own remarkable resources would give such capital and enterprise higher rewards than they had ever before attained.

The vote on the tariff act of 1816 enables us to locate more exactly the strength of this movement for the development of our resources. The states of New York, Pennsylvania, New Jersey, Vermont, Kentucky, and Ohio cast fifty-six votes for the bill and only seven against it. It is true that New York and Pennsylvania are coast states and were, therefore, to some extent directly interested in foreign commerce. Yet they extend so far into the interior that their public sentiment at that time was rather western than eastern.

Moreover, New York city and Philadelphia already realized that our internal commerce would, in time, far surpass as a wealth producer any conceivable traffic with the outside world. They also knew that their own interests were bound up with the development of the latter rather than the former.

The people of the far east were not able to look at the matter in this way. It might have been said in 1816 as John Randolph said in 1824: "When we look to Salem and Boston, to parts of the country where skill and capital and industry notoriously exist, we find opposition to this bill." The national spirit of the south had been thoroughly roused by the war with England, and though it could see no direct profit to itself in the measure, a desire for greater industrial independence on the part of the nation led its statesmen to join hands with the middle states and the west in passing the tariff act of 1816. The generosity of the south at this time was the decisive factor which determined that a protective policy should dominate the legislation of the country for many years. The tariff bill of 1820 failed to pass. The act of 1824 would have met a like fate had it not received decisive support from New England. This support was undoubtedly due to the remarkable development of the cotton industry from 1821 to 1824, under the stimulus of the heavy protection afforded by the act of 1816.

The great agricultural population of the country proposed to solve the difficulties which confronted it, as follows: They proposed to give to American inventiveness, capital, and industry the greatest possible inducement to apply themselves to improvement of the methods and reduction of the cost of inland transportation. They proposed to meet foreign legislation that restricted our opportunities for exporting agricultural products and carrying ocean freights, by domestic legislation that would restrict the importation of foreign manufactures into the United States, and that would retaliate in full for discrimination against our merchant marine. They proposed by a protective tariff to give capital an opportunity for enterprise in domestic manufactures, which they confidently believed would in time afford a home demand for farm products sufficient to justify the highest values that had been placed upon their lands.

This leads to the consideration of the manufacturing industry from which so much was hoped. There had been some manufacturing even in the colonial period. Washington watched the development of certain industries in the New England states in the years immediately following the revolution with the keenest interest. The framers of the tariff act of 1789 were confident that it would warrant a free application of capital to manufacturing. The reasons for its failure to do so have already been noted. Yet even under this act the illegal seizures of American merchantmen by the ships of England, France, and Spain discouraged some of the more timid mariners and caused the investment of small amounts of capital in manufacturing. The embargo act increased these investments considerably, and the war of 1812, which for a time caused an almost complete cessation of foreign trade, was attended by marvelous development in domestic manufactures. It seemed, therefore, when the act of 1816 was passed that a good start had already been made toward the industrial independence so desired by a majority of the population. Their bright anticipations were not to be realized for many years. With the coming of peace England expected a large increase in the demand for her manufactures on the continent, and increased her output accordingly. But peace closed the markets of the continent to English manufacturers much more effectively than war. The goods shut out of the European markets were sent to the United States and sold for whatever they would bring on terms to suit the purchaser. How unprofitable this method of disposing of their surplus product resulted has already been noted. Our imports from England in the years 1815–1819 were $104,000,000 in excess of what they would have been if the proportion to our total imports had been the same as during the third decade of the century. It is probable that the importation of this $100,000,000 worth was the direct result of the forced exportation. As a consequence of these extraordinary importations the market for domestic manufactures during those years was practically ruined, and, as if this were not enough to destroy all the progress made during the favorable conditions of the war of 1812, a remarkable European demand for our agricultural products offered great inducements to turn the capital formerly used in manufactures into agricultural channels. So strong was this demand that the average annual export of wheat and flour for the years 1817 and 1818 was $15,500,000, or three times the annual average during 1821–1830. In spite of these discouraging circumstances considerable investment of capital in manufacturing industries was being made. As early as 1818 the largest woolen factory, and the one best supplied with machinery in the United States, was located in Kentucky. The capital invested was $150,000 and its supposed annual capacity $400,000 worth of cloth. In 1817 $80,000 capital was put into an enterprise in Cincinnati, whose annual product under favorable circumstances amounted to $150,000, the largest item being steam engines.

There are no data from which a satisfactory estimate can be made of the amount of manufactures produced in 1820. The census returns enable us to get some idea of the relative importance of different industries in different localities. The digest of manufactures contains returns in regard to 2,895 employees in Rhode Island. Ninety two per cent of these were employed in the cotton industry and over half of the remainder in woolen factories. The relative importance of leading industries in Massachusetts, based on returns of 4,465 employees, is indicated by the following percentages: cottons, 49; woolens, 11; paper, 9; and iron, 3. Of 3,321 employees in Connecticut 39 per cent were employed in the cotton industry, 14 per cent in the manufacture of mechanical appliances and tools, 16 per cent in the woolen industry, 3 per cent in iron, and 8 per cent in paper. The returns from eight of the leading manufacturing states show that twice as many employees were engaged in the cotton as in the iron industry, and three times as many as in woolen manufacturing.

Other contemporary testimony seems to warrant the acceptance of these figures as indicating the relative importance of the industries and in some degree their relative prosperity.

Gauged by the same standard, the leading manufacturing industry in Ohio was the manufacture of malt and spirituous liquors, though the iron industry was a very close second. The importance of the textile industries is indicated by the experience of a Philadelphia loom maker, who reported that his product of seventy looms a week was not nearly equal to the demand. The people of Rhode Island were in 1821 congratulated on the prosperity of their extensive cotton mills. Philadelphia at the same time was investing in cotton looms at an unexampled rate. Paterson, New Jersey, reported that, while two years before three of her sixteen extensive factories were running, now nearly all were in active operation. In 1822 the annual dividend of the Waltham cotton factory was 25 per cent. Niles' Register announced in June 1822 that new cotton mills were everywhere being erected or old establishments being improved.

The shipbuilding industry was already of such recognized importance that satisfactory information is easily obtained as to the tonnage produced and as to territorial distribution of the product. Maine led the list, producing nearly one third of the entire tonnage of sailing vessels. Massachusetts produced nearly one fourth of the total. New York, Maryland, and Louisiana held the third, fourth, and fifth places as builders of sailing vessels. The total product of the country was nearly 52,000 tons, worth about $3,000,000.

On the whole, the manufacturers who suffered so severely during the apparently splendid advance of agricultural interests following the war of 1812 were now in much the better position. There was an abundant supply of cheap labor, loanable funds were seeking investment at lower rates than ever before known in this country, the raw materials of the different industries shared in the general decrease in the value of the products of all extractive industries, the feeling in favor of tariff protection for manufactures was increasing, and the legislation of Europe was of such a nature as to convince the American farmer that a home market was the only one that he might hope for in the future.

Such a view of the possibilities of our foreign trade was not altogether warranted. The returns for the fiscal year 1821 indicated some small improvement already in progress. In that year the total imports of the United States amounted to $63,000,000. We re-exported $21,000,000 worth of foreign products. This means that in about one third of its foreign trade, the United States practically acted as an agent in transactions between other countries. We exported $20,000,000 in cotton, an amount sufficient to pay for nearly one half of all goods imported for domestic consumption. The exports of products of the sea, of domestic manufacture, and of the forests were respectively two, three, and four million dollars. Fifty eight per cent of all our exports were sent to Europe. Sixty three per cent of our imports came from there. Our deficit in the European trade was made good by the Asiatic trade, which took 14 per cent of our exports and returned only 8 per cent of our imports. The exports and imports to and from Africa and parts of the American continent other than the United States were very nearly at an equilibrium. The trade with the western hemisphere was about twice as large as that carried on with Asia, but hardly half that with Europe. About three fifths of the goods retained for home consumption were manufactures. Among these cottons held the leading position as to imports by a very narrow margin above woolens. Woolens by about the same margin were first as to the amount retained for home consumption. One fourth of the importations of cottons and of silks were re-exported. One half of the sugar and coffee imported was reshipped. Practically all the other imports of food products were for home consumption, though some of the molasses was re-exported in the form of rum. At least one fourth of the imports retained for home consumption were food products. The use of the term food here may be somewhat strained, since one third of the amount was made up of malt or spirituous liquors, while tea and coffee, with the sugar to sweeten them, and molasses (a large part of which was turned into rum) made seven eighths of the remainder. The large movement of gold and silver is one of the striking features of the year's trade. $8,000,000 were imported and $11,000,000 exported. The excess of exports in this item shows that economic conditions were such that the United States did not choose to return current products for the foreign commodities imported but found it to her economic advantage to make payment for the same out of the savings of former years.

The facts so far presented may be summarized as follows: The proportion of the population engaged in farming was so large that the United States may be spoken of as essentially an agricultural nation. Speculative values of farm property and the accompanying extravagance had bankrupted many of the eastern farmers and driven them to new homes in the west. Consequently an area capable of producing much more than the country could consume at that time had been opened up for farming. The difficulties of transportation were such that the expense of carrying the products of the rich farms of the Mississippi valley to the eastern cities far exceeded their value when delivered. The farms on the Atlantic slope, however, produced a surplus for export, which could have been very largely increased had not expensive transportation and foreign tariffs swallowed up all the profits.

As a result of these conditions the prices of all products of the northern farms were exceedingly low. The extraordinary advantages of soil and climate enjoyed by the southern planter and his use of water transportation for the comparatively short distance to the seashore, had combined with the rapidly increasing demand for cotton, to maintain that commodity at a very satisfactory price. Seizures, restrictive legislation, and war had made investment in the ocean carrying trade so unpopular, and mechanical inventions had made the operation of factories so much more feasible, that a considerable amount of capital had been gradually seeking the latter mode of investment ever since the beginning of the century. The tariff of 1816, intended to sustain and encourage this movement, failed to accomplish its purpose during the next few years, because of European conditions which offered special inducement to American purchasers, because of the great inducement to invest capital in the real estate speculation, and because of the increased prices of raw material. By 1820, however, these conditions were so changed that the agricultural industry, aside from cotton raising, was exceedingly depressed, and the manufacturing interests were evidently about to enter upon a period of prosperity.

In spite of these unfavorable conditions for foreign trade in the United States one is surprised to learn that its total amount was smaller in 1830 than it had been in 1800. From 1821 to 1830, it amounted, in round numbers, to $1,600,000. This was $100,000,000 less than for the first decade of the century. In the five years, 1821–1825, it was larger by $10,000,000 than in 1826–1830. In the first two years of the decade it was $293,000,000, in the last two $291,000,000. These facts indicate a slight decline in our foreign trade at a time when an increase was to have been expected, for the expansion in international commerce, which has been so marked a feature of the economic history of the nineteenth century, was already in full progress. Measured in commodities the foreign trade of England increased 50 per cent from 1820 to 1830. Its annual money value advanced from £75,000,000 sterling during the opening triennium of the decade to £100,000,000 sterling during the years 1828–1830, Of the seven countries that had a foreign trade in excess of $100,000,000 in 1820 as well as in 1830, the United States was the only one whose foreign trade was declining. France, Russia, Holland, and Belgium were extending their international commerce even more rapidly than England. This general expansion of the foreign trade of the world was taking place at a time when most of the nations engaged in it were endeavoring by tariff legislation to develop their own internal domestic industries. The effect of such legislation in restricting the extension of trade between different countries appears to have been confined almost entirely to the United States. The reason for this was undoubtedly the abnormal development of our commercial interests during the early years of the century.

The complicated network of cause and effect which must be untangled in any detailed study of the foreign trade of a country, is, under the most favorable circumstances, little less than appalling. The thread in this snarl which usually requires the most delicate manipulation is the balance for or against the country in its financial account with other nations. Fortunately this perplexing element in the problem can be eliminated before the detail work on the exports and imports of commodities during the third decade of the century is undertaken. It was not till after 1830 that the United States used foreign capital in such amounts that its introduction forced importations and its withdrawal in times of financial stringency abroad, compelled exports not warranted by normal conditions of production. In 1820 American investments abroad equaled in amount the foreign capital invested in the United States, and this condition of things continued throughout the third decade of the century.

During that period our exports of merchandise and specie amounted to $765,848,782. In addition to this, we sold 117,654 tons of shipping to foreigners. Probably very little of this was sold as low as $40 a ton. Taking that as the average price, the aggregate value would have been $4,706,160. The large earnings of our merchant marine in carrying freight for foreigners is another credit item in this account. The fleet in service during the decade was equal to 6,783,113 tons employed for one year. If the annual earnings of this fleet be estimated at the very low rate of $33⅓ a ton, the total obtained is, in round numbers, $225,000,000. The freight earned by carrying imports into the United States, as well as that paid to foreigners on imported goods, must be subtracted from the total earnings of the fleet in order to obtain our net credit from the ocean carrying trade. Our imports were, in round numbers, $800,000,000. The expenses of importation were estimated by competent contemporary authority at 10 per cent. Subtracting the $80,000,000 freight on imports from the $225,000,000 of total earnings, we obtain a net credit through the operations of our merchant marine, of $145,000,000.

This amount was made up of two items, freight on our own exports and the earnings on freight between foreign nations. Gallatin estimates our freight earnings on exports at a little over 16 per cent of the value carried. At 15 per cent the earnings for the decade would have amounted to $100,000,000. At that time a ship was expected to make three

European voyages annually. Taking this as the average length of voyage for ships engaged in our own carrying trade, we find by dividing the total domestic tonnage entered and cleared in the decade, by six, that less than three fourths of our ships were needed for that trade. But, on the chance that this may be an underestimate, let us say that four fifths were so engaged. This would leave one fifth of the whole number free for freighting between other countries. This is just the number required to earn the remaining $45,000,000 at the assumed rate of $33⅓ a ton. There were credits arising from several other sources, of which the amount cannot be estimated. Gallatin enumerates them as follows: "Those arising from the fish which, from the bank, is carried directly to foreign ports; of the whale and spermaceti oil, sold by the fishing vessels in South America; of the furs collected on the northwest coast and sold in China." The total of the three items, of which estimates have been made, is $915,500,000.

The total amount of merchandise and specie imported in the decade, according to the government returns, was $798,632,565. If the law was strictly followed this amount included 10 per cent on nearly the entire value imported and 20 per cent on the rest, to cover the estimated charges on importation. A large part of this went to the American merchant marine and should not be included as a charge in the international account. There is some doubt as to whether this addition to import values was always made. On the other hand there is no question but that there was much fraudulent undervaluation of imports. Neither of these sources of error, which operate against each other, can be accurately determined, but it does not seem probable that the fraudulent undervaluations could have exceeded in amount the additions made for freight really earned by the Americans themselves. Another indeterminate debit item arose from the expenditures of American travelers abroad. It hardly seems possible, however, that these could, at that time, have exceeded in amount the importations by immigrants into the United States.

There was one serious error operating to decrease the valuation of imports, the effects of which can be estimated with some degree of accuracy. This was the undervaluation of the pound sterling in the treasury department. In getting the amount of English invoices, a pound sterling had been considered equal to $4.44, though its average value for the decade was about 10 per cent more than that. English imports amounted to over $300,000,000 for the decade. We ought therefore to add at least $30,000,000 to the total value of imports, given above.

Even with this addition, the total of debits against the United States for the decade amounted to not quite $830,000,000, or $85,000,000 less than the total credits.

Gallatin attacked this problem in a somewhat different manner, as early as 1831, and reached the conclusion that "the amount of exports including freight and those items which cannot be ascertained, has certainly exceeded that of the imports."

The balance in favor of the United States obtained above was undoubtedly seriously reduced by the profits made by foreigners on business carried on in the United States. It is hardly possible, however, that these profits could have been sufficient to turn the balance against us. It is a matter of no surprise therefore, that in 1830 Niles' Register declares all the world in debt to the United States. Exchange on England, France, Havana, and South America, was at a discount.

The imports and exports of the precious metals during the decade was of a character to strengthen the opinion that the United States was financially independent. During the years of panic and crises preceding 1821, her stock of metallic money had been considerably increased. As a result, the supply of such money, at the beginning of this decade, made up over one third of the entire currency. At that time, as ever since, a currency largely composed of metal was not acceptable to the American people. The facts that by far the larger part of the metallic money in the United States was silver, and that the wide territorial distribution of our people called for a money which could be transported over long distances with safety and economy, explain, in part, their preference for a paper currency.

Langdon Cheves, and the other men who controlled the issue of the bank notes from 1821 to 1825, were decidedly opposed to the expansion of the currency. The precious metals in the country were much in excess of the amount required for bank reserves unless such expansion was to be made. It followed that the export of gold and silver as merchandise, irrespective of the condition of international credit balances was to be expected.

Such an export began in 1821 and continued throughout the first half of the decade. The exports for the five years amounted to $43,500,000, the imports to only $31,200,000, the net export for the period being $12,300,000. The net import of merchandise during the same years amounted to $25,200,000, so it is evident that the excess of the precious metals exported must have been supplemented by freights and other items already discussed, in order to preserve a balance in the current transactions.

It is probable, however, that the result of all transactions for the five years was a net credit to the United States. This much is sure. In England, where, if anywhere, an unfavorable balance might be expected, the purchasers of our products were failing, in 1825, to meet their obligations to American merchants. The large net exports of the precious metals during this period, from a country which did not produce her own supply, suggests at once the liquidation of obligations. But if there was any foreign capital in use in the United States it must have been European, and yet in these same years Europe sent us $8,032,000 in gold and silver, while we returned only $5,847,000. In two years of the five our exports to Europe were greater than our imports. In 1822 the movement of commodities between the United States and Europe resulted in a balance against us of over $10,000,000. It is not surprising, therefore, that in part payment of this balance there was a net export of the precious metals to Europe, amounting to $750,000. Again, in 1825 there was a net export of $1,000,000 to Europe, but this would have been unnecessary if the English cotton speculators had paid for the $30,000,000 worth of American cotton they imported that year. During the last five years of the decade, the stock of gold and silver in the United States increased faster than it had decreased in the first. The panic of 1825, though by no means a serious matter in the United States, had shown the need of a larger metallic basis for our credit system. In 1826 our net imports of the precious metals were nearly $2,000,000. In the last two years of the decade the net imports were nearly $9,000,000. These large importations of specie, immediately following the year 1828, in which the balance on the movement of commodities had been nearly $17,000,000 against us, indicate that the country was in a very strong position financially.

To some the facts that have been presented will form a sufficient basis for the conclusion that at no time during the third decade of the century was there any considerable amount of foreign capital invested in the United States. Our discussion has at least established the fact that imports were at no time materially increased by the desire of European capitalists to transfer their investments to this country. It is also evident that the return of such investments at no time forced exportations of domestic commodities not warranted by our differential advantages in their production.

FOREIGN TRADE OF THE UNITED STATES.

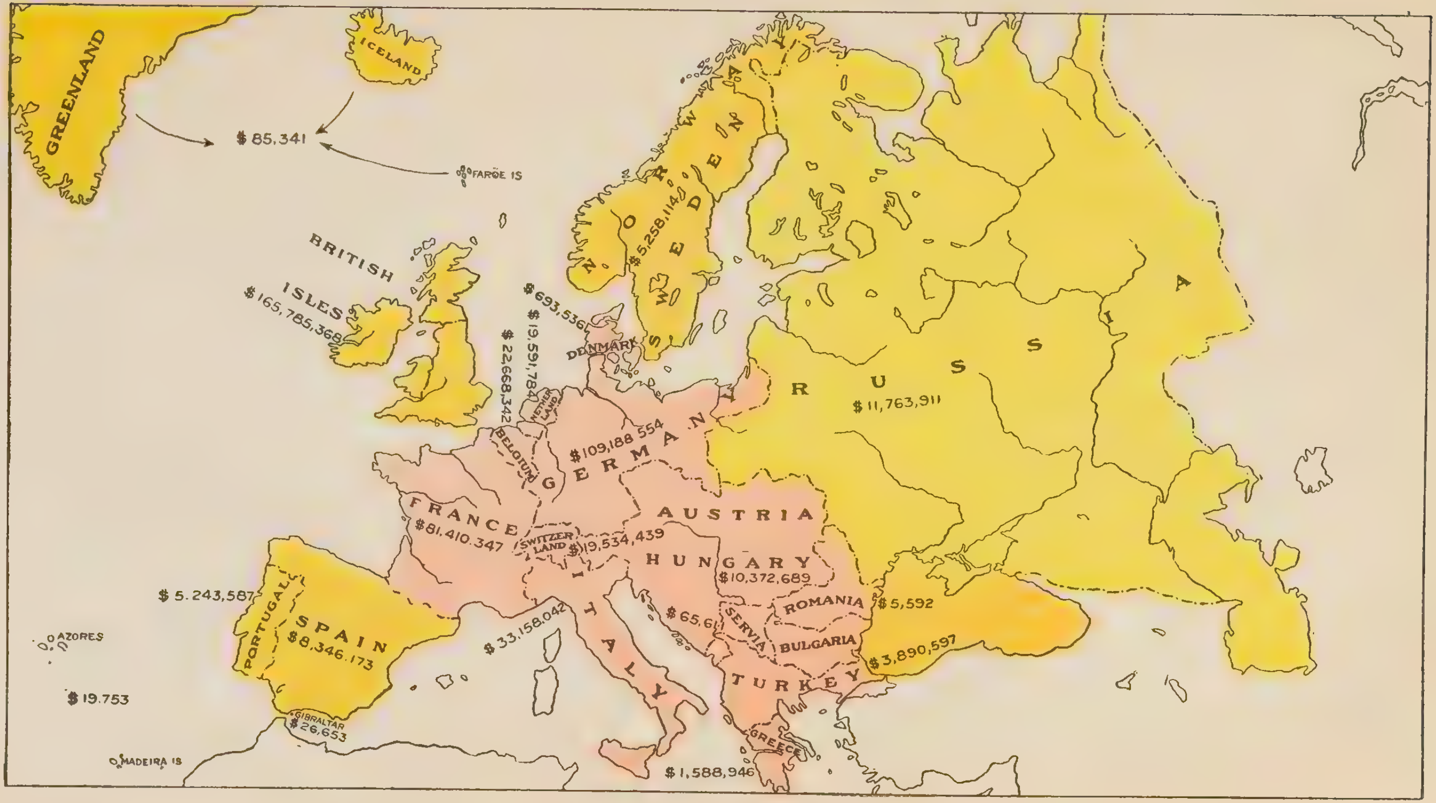
BY FREDERIC EMORY.

[Frederic Emory, chief of the bureau of foreign commerce, United States department of state; born Sept. 18, 1853, at Centreville, Maryland; he was educated at the Centreville academy, and at St. John's college, Annapolis; during his early life until 1893 he was a newspaper writer on the staffs of the Baltimore Sun, the Public Ledger of Philadelphia and other papers; in that year he was appointed secretary of the bureau of the American republics and in 1894 chief of the bureau of statistics, department of state; during the year 1898–99 he was also a director of the bureau of the American republics; he is the author of a novel entitled A Maryland Manor, and has edited a large number of reports connected with his work, besides making contributions to the journals and magazines.]

The pre-eminence of the United States as a "universal provider" of food stuffs and raw materials has long been established, but it is only in recent years that we became a serious competitor of the older industrial nations in the world's markets in the sale of factory products. Our progress was unexpectedly rapid and widespread, and its phenomenal character caused conservative observers to apprehend that it might prove to be but temporary and limited to periods of overproduction, resulting from a more or less sluggish home demand.

This theory found strong confirmation in the falling off in exports of manufactures in 1901, which followed close upon the extraordinary increase of industrial activity in the United States and the consequent demand for iron and steel and for many other articles we had previously been exporting on a steadily rising scale. But while domestic consumption grew at such a pace that we had less and less of certain goods to send abroad, there was no diminution in the foreign appreciation of and demand for American machinery, implements, tools, labor saving apparatus, household utensils, furniture, boots and shoes, and many other articles which had been found to have distinctive merits by comparison with similar goods of European origin. The fact, in other words, was demonstrated that the foreign customer had not merely been tempted into buying from us by "cut" prices to get rid of surplus stock, but was so impressed by the superiority of

ANNUAL IMPORTS BY THE UNITED STATES FROM EUROPEAN COUNTRIES



things American that he might be depended upon to bid against the domestic purchaser, and that the export trade was therefore likely to become a stable factor of our industrial as well as of our agricultural prosperity.

The gradual recognition of this probability by manufacturers and exporters would seem to account for the maintenance of interest in foreign sales and the continued efforts to extend them, notwithstanding the general increase of prosperity throughout the United States during 1902, with its vast growth in the volume of domestic consumption and the very marked enhancement of profits. There has, of course, been a considerable subsidence of export activity, especially on the part of those manufacturers upon whom the pressure for filling home orders has been greatest, but it is a notable and highly gratifying symptom that neglect of foreign trade for the more profitable home market has not been nearly so general as might have been expected. The economic movement which has characterized the recent industrial development of the United States in the creation of vast consolidations of capital, with the resulting augmentation of productive energy, promises at no distant day to outstrip any possible growth of domestic consumption. When such overproduction occurs, the result will be the same as if our prosperity were checked and the home market were again stagnant. In other words, we shall probably, in any case, have a large surplus of manufactured goods which we must export.

It is reassuring to be told by our consuls that in either event—that is, whether overproduction results from overstimulation of our industries or from diminished home consumption—the foreign markets are becoming more and more accessible to our goods, and that in even the remotest corners of the earth we are gaining substantial headway. In the least developed and most unprogressive regions, such as Asiatic Turkey, the east coast of Africa, China, and Korea, American manufactures show a steady advance, and in the most highly developed industrial countries our labor saving machines and apparatus especially enjoy an ever increasing popularity. The obvious deduction is that American goods possess distinguishing merits in such a wide range of utility and special fitness that we have only to properly cultivate our opportunities in order to indefinitely extend and hold foreign trade.

It is probably due to this increasing demand for our goods, rather than to any diversion of effort on our manufacturers from the home market, that there has been recovery in the export of factory products during recent years. The eagerness of foreign buyers in certain lines has also done much to impress upon our business interests the importance of not relaxing their grasp upon foreign markets to the point of absolute neglect. A wise merchant is not likely to lose sight of a steady customer, even at a time when he may seem unimportant in a stream of larger buyers, and our industrial concerns would have been wanting in ordinary business sense had they failed to perceive the value of keeping control of new outlets for their goods in anticipation of the time when they would again be needed.

During the fiscal year 1904, the exports of domestic manufactures were $452,415,921 or 31.52 per cent of the total exports, against $407,526,159 or 29.28 per cent for the fiscal year, 1903. The gain therefore was some $45,000,000 and the total figures larger than in any previous year of our history, while the percentage of manufactures was greater than in other years excepting only 1900.

It is evident from these figures that any sensible decline in the foreign demand for American goods is to be attributed to trade depression in the purchasing country rather than to the substitution of other sources of supply, and that United States manufactures, so far from suffering a diminution of favor in any part of the world, are continuing to impress themselves upon foreign purchasers, and in some quarters have gained new territory, while at the same time extending the old. Although some branches of American industry are no longer attempting to compete in export rivalry because their energies are strained to the utmost to supply the home market, the steady increase of inquiries received by the bureau of foreign commerce from important firms as to the opportunities for the sale of their goods abroad confirms the view that the export movement is sufficiently substantial to cause a general growth of interest and activity on the part of our industrial interests.

It would be a serious mistake to assume from the indications which have been cited as favorable to our sustained and increasingly successful competition with the other industrial nations for a much larger share of the world's trade, that we have only to go forward on existing lines. Our success has been more a matter of accident than of design, and was largely the result of economic conditions peculiar to ourselves, which had no relation originally to foreign trade, but sprang from our absorption in an industrial activity purely domestic and directed solely to supplying the home market. Even yet, we cannot be said to be manufacturing expressly for export to any large extent, and the study of conditions in foreign markets and the intelligent direction of industrial energy to meet them effectively has not gone much farther than the initial stage. Moreover, the success we have achieved, and the superiority which our goods have developed when brought into comparison with those which had previously been most in favor in foreign markets, have naturally aroused our chief competitors to the necessity of a more strenuous rivalry. That this competition is taking practical shape is seen not only in the substitution of American machinery and American economics of production in many of the European industries, but in the agitation in Germany and Great Britain especially for the improvement of government facilities, such as the consular service, the work of commercial agents, the publication of industrial and commercial reports, etc., for the promotion of trade.

Such access of competitive energy may outweigh to a considerable extent the advantages we now enjoy, and it suggests the importance of preparing ourselves for the time when our goods may no longer be able to "sell themselves," as they have so largely done in the past and are still doing. It is within the bounds of reasonable probability at least to assume that, when another period of great accumulation arrives, we may find it difficult to unload upon foreign customers by merely shipping the excess abroad. We succeeded in doing this once, because we took Europe by surprise, but it is by no means certain that we could do it again, now that Europe is fully awake to our industrial superiority and is equipping herself to meet us at every point. There is danger, too, that we may fail to appreciate the fact that our very prosperity at home must beget in time a condition of things which will make the need of foreign outlets imperative, if we would keep our factories open and our laboring population fully employed. Prosperity inevitably stimulates production, and sooner or later, as has already been indicated, we shall be face to face again with a large excess.

On this point, Mr. E. Seymour Bell, the British commercial agent says, that as long as this country continues in its present prosperous condition, absorbing all that it can produce in the way of iron and steel, British manufacturers need not fear serious competition in those articles in the world's markets. It may be pointed out, however, continues Mr. Bell —"that, on the strength of the considerable imports, much capital is being employed in extending existing and building new works in order to bring the supply up to the demand. The home market, is, of course, the most profitable for the manufacturer, and as long as the demand continues, little thought will be paid to other and less profitable markets except in the way of keeping them in view, so as to be able to export on a large scale when the time arrives."

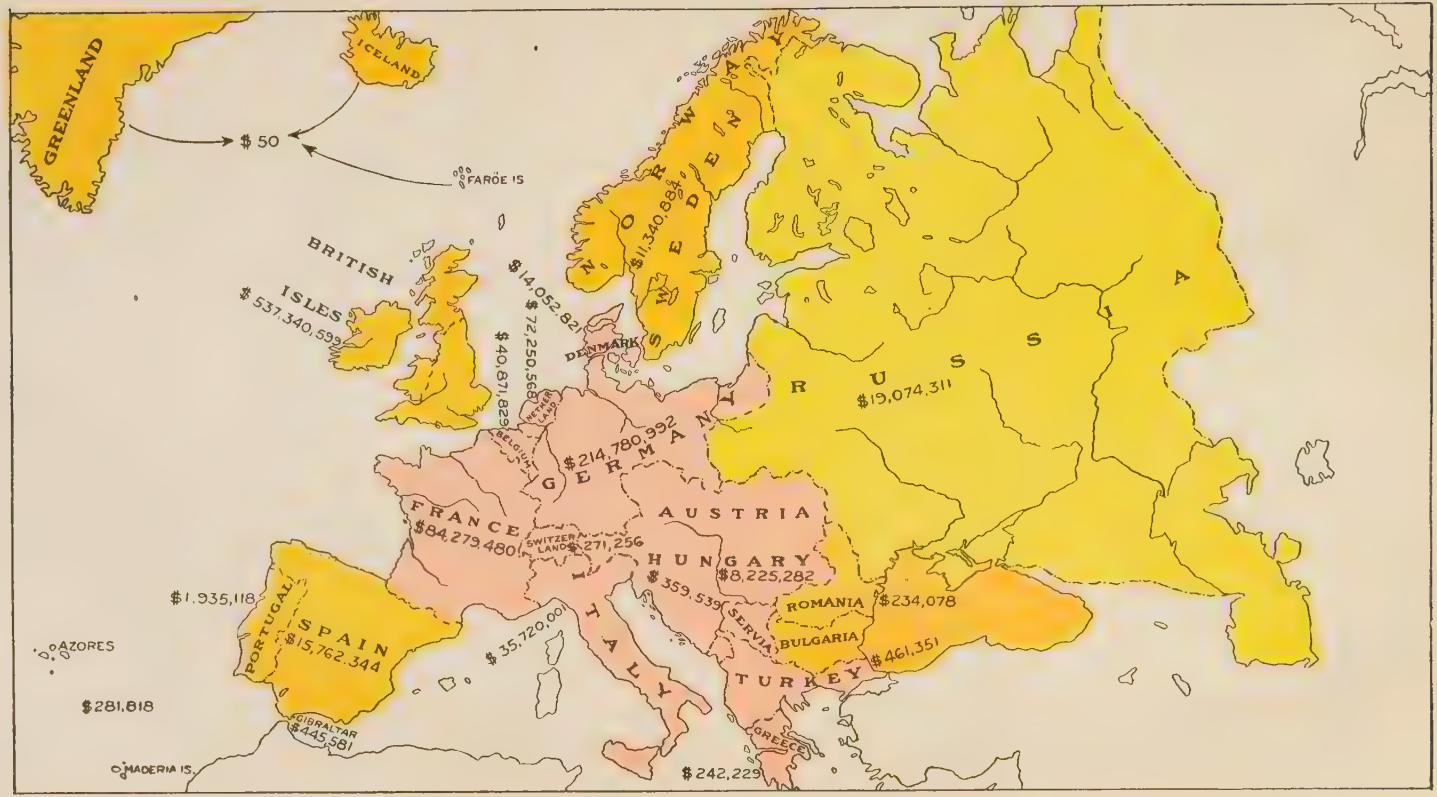
Mr. Bell then gives, from an American technical journal, statistics of the provisions being made for increased production, and adds that this prosperity cannot last; there must be "an overproduction exceeding anything hitherto experienced," from the increasing output and a falling demand at home. To meet this contingency, preparations are being made by the railway, shipping, and other interests to carry the surplus cheaply to foreign countries. "The last of the great combines, the Atlantic shipping, is doubtless part of this great scheme." Meanwhile, adds Mr. Bell, those British manufacturers who have not already done so will have an opportunity of remodeling their works and placing them in a condition to be able to meet the inevitable and severe competition.

Another striking illustration of the growing importance of foreign trade as the balance wheel of our industrial mechanism, even in times of great domestic prosperity, is seen in the effect, on two occasions, of the stoppage of the Chinese demand for cotton goods. During the Boxer troubles the southern cotton mills, which manufacture especially for the Chinese market, were reduced to such serious straits by the suspension of orders from China that they were forced to undertake the production of a class of goods which competed with the output of the New England factories. Fortunately, the Chinese market was reopened to them just in time to prevent a crisis in the trade which would probably have proved disastrous. In October 1901, for some reason as yet unexplained, the Chinese demand for cotton goods again fell off, and it was not until the middle of December that the orders expected in October began to come in. In the meantime, the southern cotton mills once more were confronted with the alternative of competing with the New England industry or of remaining idle. In either case, a heavy loss would have been inflicted upon an important interest. When we reflect that our exports of cotton goods to China represent but a part, though the greater part, of our sales of such goods abroad, it may be seen that very serious results might easily follow the withdrawal of even part of the foreign demand for the product of a particular industry.

The truth is that the United States has been gradually drawn, without volition of its own and by the play of economic forces which it has more or less unconsciously generated and set in motion, into a state of greater or less dependence upon foreign markets for the maintenance of its industrial prosperity. This dependence is hardly perceptible to the manufacturer working full time and perhaps overtime to supply home orders, but is none the less real, even for him, since it may become imminent at any moment from a sudden change of conditions. Moreover, our trade relations with the world at large are constantly becoming more intimate and more reciprocal, not only from the growing sales of our goods but also from investments of American capital in foreign countries. We are exporting not only the products of our factories and workshops, but money, skilled labor, brains. Within the past few years, a number of our large industrial concerns have established plants in Europe, in Canada, and elsewhere for the manufacture of goods for which there was an active demand. The drift became so noticeable in 1901 that the consuls were instructed to include in their annual reports any data upon this subject that they might be able to obtain. Their attention was also called to the fact that Americans were engaging largely in various business enterprises, such as street railways, furnishing supplies under government contracts, mining, etc., and they were told that full information as to such undertakings would be appreciated. Over 1,000 United States companies, firms, and individuals have made investments in Mexico, aggregating $500,000,000 gold, one-half of it within the past five years. In Canada millions of dollars of United States capital have been invested during the past year in agricultural and timber lands, and in mining and manufacturing industries. The Westinghouse company has erected large plants in Canada, in England, and in France. In Russia the manufacture of air brakes has been begun by a New York firm. The Singer company has branch works for the manufacture of sewing machines in Germany and Russia. An American firm manufacturing shoe machinery employs 100 hands at Frankfort on the Main. Another American house, manufacturing tanners' machinery, has storehouses and repair shops at Frankfort; at Vienna, Austria; and at Leicester England. These instances are cited as showing that we are not only entering largely into the ordinary business life of foreign peoples in trade and in agricultural or mechanical pursuits, but in countries developing industrially, are becoming important factors of their progress in manufactures. It would seem to follow that, as we broaden the scope of such enterprises, we shall inevitably bring about a closer and closer state of interdependence.

As such interdependence grows closer, it necessarily becomes more sensitive to distributing influences, and more complex. When our trade relations with a foreign country are merely casual or intermittent, the reflex influence upon ourselves is comparatively unimportant; but when they become a permanent and growing factor of our business life, they affect the equilibrium of our whole economy and give

ANNUAL EXPORTS FROM THE UNITED STATES TO EUROPEAN COUNTRIES



rise to many difficult conditions. It follows, therefore, that if our export of manufactures and our industrial investments in foreign countries have created a reciprocity of interests which is likely to continue and to be woven more and more inextricably into the web of our industrial activity, we cannot afford to rely any longer upon instrumentalities not specially shaped for promoting trade intercourse with other nations, and successful in the past only because they happened at the moment to be sufficient. The question whether our sudden emergence from domestic seclusion into the wide arena of international competition was to be merely transitory would seem to have been definitely settled in the negative. The measure of our success in that competition remains to be determined. It must depend not only upon the efficiency and greater productive capacity of our workmen and the superiority of our wares, but upon the ability we develop in winning trade from strenuous and skillful rivals. In other words, we must have the best machinery, not merely for manufacturing goods, but for selling them when made.

For years our consular officers have been supplying manufacturers and merchants with information as to almost every conceivable detail in the special requirements of particular localities for gaining and holding trade. These requirements vary not only with every country, but often with different sections of the same country. It is obvious that a careful study of them—as, for example, the patterns, measurements, methods of packing, trade usages, terms of credits, etc., peculiar to a certain territory—is essential to the manufacturer or exporter, if he is to properly equip himself for a sustained and energetic struggle with foreign rivals already, in most cases, in occupation of the field. Our consular service is showing itself to be generally alert and responsive to the new conditions. The consuls have also been most active in sending reports at frequent intervals on a great variety of subjects of interest to the industrial and commercial world. A most gratifying evidence of the increasing value of the consular reports, of which there are now five classes—annual, quarterly, monthly, special, and daily—is found in the widespread demand for them on the part of colleges and schools as reference books in special courses of commercial instruction. This demand has grown up within the past few years, and in itself is symptomatic of the spread of popular interest in foreign trade.

In addition to the published reports, the consuls of late, by means of correspondence conducted under the supervision of the department of state, have supplied a great mass of information to trade bodies and business firms, and in many cases have voluntarily exerted themselves in other ways to promote commercial expansion. Their efforts frequently elicit warm commendation in letters to the department from the trade interests thus benefited, and even when a consular officer lacks other qualifications, it seldom happens that he fails to exhibit the characteristic American spirit in "hustling" for business, not for himself, but for his country. With judicious improvements in the consular organization, it may readily be seen that the service might be made an unrivaled auxiliary of that concerted and intelligently organized movement for efficient export methods which promises soon to be an absolute prerequisite to further extension of our foreign trade.

PROGRESS AND PROMISE IN AMERICAN SHIPBUILDING.

BY LEWIS NIXON.

[Lewis Nixon, president and director of the American Shipbuilding company; born April 7, 1861, Leesburg, Va.; he was appointed a midshipman in the United States navy in 1878 and four years later was graduated at the head of his class from the United States naval academy, and was then sent by the navy department to the Royal naval college at Greenwich, England, and in 1884 was transferred to the construction corps of the navy; six years later he designed the battleships Oregon, Massachusetts, and Indiana, and resigned his navy post to become superintending constructor for the Cramp shipyard of Philadelphia, resigning in 1895 to establish a shipyard of his own at Elizabeth, N. J.; in 1898 he was appointed president of the East River Bridge commission and in 1902, New York commissioner to the Louisiana Purchase exposition; in 1901 he succeeded Richard Croker as leader of Tammany hall; he was chairman of the finance committee of the democratic congressional campaign committee. The following article is from the Engineering Magazine.]

In discussing the progress of shipbuilding, I shall confine my observations to the steam marine; not because no advancement has been made in construction of sailing vessels, but because almost the whole volume of popular interests centers on steam and the development of the steamship.

To avoid tedious and irrelevant detail I will date the era of the modern metal-built steamship in this country from the laying of the keel of the George W. Clyde—about 1869.

Some other coasting steamships were built in that and the two succeeding years, and in 1872 the Cramps entered the transatlantic field with the four ships of the original American line,—the Ohio, Indiana, Illinois, and Pennsylvania.

Roach soon followed with various products of the Chester shipyard for the Pacific Mail, Brazil, and other lines, and Harlan & Hollingsworth of Wilmington struck and held the pace of a good second to their larger neighbors.

But, ably and promising as this new era was ushered in, its progress did not sustain the promise of its inception. Good ships were built, and the American practice in yard or shop did not lag behind that of English builders. The market for their wares, however, did not rise with the development of facilities. The government, which in one way or another must always foster any successful shipbuilding industry in this or any other country, remained supine during the early year of the new era. And, while our government was thus neglectful, every resource of the British government was applied, and every inducement offered, to promote the progress of shipbuilding in England.

These conditions prevailed all through the seventies and the first half of the eighties, until the government, resolving to have a new navy, appeared in the market as a customer.

Fortunately, during this dreary period of twelve or fifteen years of inanition, the material of our coasting traffic found need of renewal or increase, and the demand incident to this fact proved just about sufficient to nurse the spark of life in American shipbuilding.

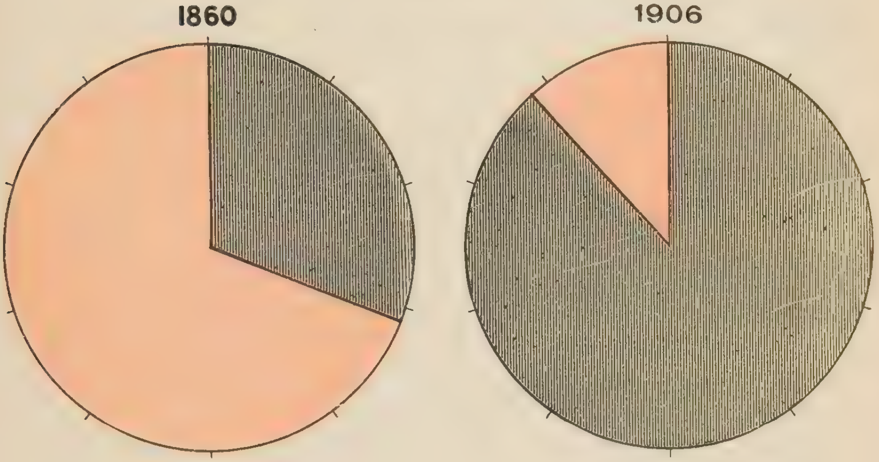
Meantime English shipbuilding was progressing by leaps and bounds,—gaining almost absolute control of the North Atlantic, because, no matter where owned or under what flag sailed, almost all ships in North Atlantic lines during this period were built in England. Subsidies were showered on English steamship lines, and English shipyards and machine shops were glutted with contracts for construction of hulls and engines for the British navy.

About all that American statesmen attempted for American shipbuilding during this fitful epoch was the introduction of free ship bills in congress! No matter what theories prompted this proposed policy, its practical result would have been the employment of American resources to aid the English government in its efforts to promote English shipbuilding.

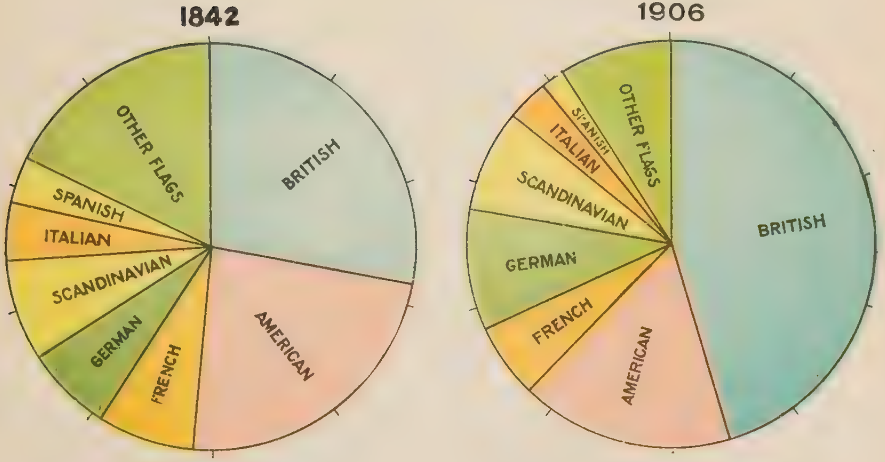
In 1883 the government began its new navy with the Chicago, Boston, Atlanta, and Dolphin. These were the first steel ships. As soon as their construction was attempted, the result of twelve years neglect became apparent. Nobody knew whether this country could produce the necessary material or not, but the three leading shipyards of the east submitted bids. Roach got the awards, but the sequel proved that he had discounted the unknown chances too heavily. The vessels, however, while not proving a source of profit, established a high standard for future construction, and are to-day useful and serviceable on the active list of the navy.

SHIPPING OF ALL NATIONS

PROPORTION OF STEAM TO SAILING VESSELS
STEAM SHADED



CARRYING POWER



Whatever may have been its effect on Roach as an individual shipbuilder, the general effect of this venture on American shipbuilding at large, and in the long run, was to give it a new lease of life, and inaugurate for it a new era of progress.

The reader will doubtless have perceived by this time that I am laying the foundation of an argument to the effect that shipbuilding, more than any other industry in this or any other country, is integral to the national welfare, prestige, and even political independence, and hence must always be, in the best and most patriotic sense, the protégé of the government. This I maintain strenuously, and I need only to call attention to the manifest results of the experience of other maritime nations to prove the truth of my premises and the soundness of my conclusions.

The government pursued its policy steadily; not indeed liberally, as compared with other great maritime powers, but still steadily and consecutively. What was the result?

By the time the third batch of ships was authorized, it appeared that American shipbuilding, with its contributory industries, which had groped in the dark in 1883, had by 1889 already outgrown the demand that created it. Never in the history of shipbuilding anywhere had such progress in every direction and in every branch been seen; never had so small an impetus put in motion such giant forces. Had bids for the construction of the New York and Olympia been invited five years sooner than they were, the contracts would have gone to England, or the ships remained in model on or tracing paper. Had the bids for the construction of the first three battleships been invited in 1885 instead of 1890, American shipbuilding would have had a stroke of apoplexy due to surfeit. But five years of the progress of American shipbuilding, even under the meager encouragement offered, had made easy tasks of these battleships, and, instead of being surfeited, the industry already hungered for more.

If we turn elsewhere for illustration or example, we shall find that twice, since we began our new navy, has England launched on her shipbuilding market single programmes of new construction exceeding in displacement and cost our entire fleet.

CONCORDIA COLLEGE LIBRARY
BRONXVILLE, N. Y. 10708

Before we began our new navy, Great Britain had the Bellerophon as flagship of her North Atlantic and West Indian squadron, old even then, but more than a match for any vessel we possessed. But, as we have launched ship after ship, the English vessels on this station have been keeping pace with us in strength, and the successor to the Bellerophon, the splendid armored cruiser, Blake, has been succeeded by a battleship, since our Indiana was commissioned.

The inference is obvious. What we have seen and what we know requires no argument to establish; and we have seen and we know that the policy of the new navy, more than all other causes combined, has raised American shipbuilding from its struggle for existence a decade and a half ago to its exultant eminence of to-day. The believer in free ships, however, says: Very well; admitting all these plain facts as far as the navy is concerned, what have they to do with commercial shipbuilding, or with the employment of American built ships in peaceful traffic? The answer is that the New York, Columbia, Minneapolis, Indiana, Massachusetts, Brooklyn, and Iowa made the St. Louis and St. Paul possible; and they also made possible any needed number of St. Louises and St. Pauls, or better ships, in the future. In a word, our policy of the new navy broke the back of England's shipbuilding monopoly, and broke it beyond cure.

I have heard it said that, no matter what our progress in shipbuilding has been, we had to begin with English plans. Unquestionably English plans were procured at the start; so were French plans. But they were used for reference, not for imitation. No naval ship has been built exactly after any foreign plan. They have all been modified more or less. In fact, the object in having the foreign plans before us was to see what should be avoided as well as adopted, and in some cases the former desideratum proved the more important of the two. Foreign plans are as much sought after now as they were at the beginning, and for the same reason. But, withal, our best ships—the New York; the Columbia and Minneapolis; the Indiana class of battleships, the Iowa and Brooklyn; and the Kearsarge and Kentucky—are distinctively American from keel to fighting tops,—hulls, machinery, and all. So also the Olympia, and most of our smaller ships. I trust that I have made at least one point clear,—namely, that the vast progress in American shipbuilding since 1883 is due to the stimulus afforded by the naval policy of the government; that, in its absence, and under impulse of the normal commercial demand alone, no such progress would have been possible; in fact, little or none at all in comparison with that observed elsewhere. At this point I am likely to be interrupted by some western friend with the query: Why, then, has shipbuilding made such progress on the great lakes, where no part of the new navy has been built, and where the stimulus of governmental policy has not been felt? Such a query betrays ignorance of, or indifference to, the actual state of things. As a matter of fact the fostering power of governmental policy in favor of lake shipping and shipbuilding has been exhausted. First, the lake shipping enjoys the full and undisturbed benefit of the coast trade laws. Second, the terrific foreign competition that throws a constant shadow over the ocean is wholly absent from the lakes. Third, in the matter of harbor improvement and the bettering of waterways, the government has done everything for the lakes that acute ingenuity could devise or dauntless means supply.

Fourth, the public opinion of the whole region tributary to the lakes demands imperatively that they be brought to, and maintained in, a condition suitable to complete efficiency as a check on the trunk railway lines.

From these facts it will be at once perceived that there can be no common plane on which to institute comparison between shipping and shipbuilding on the lakes and on the two great salt-water coasts.

There is another prime consideration germane to the question of stimulus involved in the naval policy of the government,—the fact that, notwithstanding the feeble state of contributory industries at the outset, and the consequent necessity of initial development, the tests prescribed for physical qualities of material used in our ships have constantly exceeded in severity and precision the tests of any other country. These requirements, unprecedented as they were at the time when they were prescribed, have been met and overcome, and to-day we can say with pride that, as the gratifying result of the unusual efforts thus induced among American manufacturers, the steel made for the navy and merchant vessels of the United States is far superior to that of any other nation. This is a result of value extending far beyond the single province of marine architecture.

So much for the progress of American shipbuilding in recent years. Briefly and cursorily I have outlined its causes, and indicated some of the difficulties and obstacles in spite of which it has been achieved. As it stands, it fills a splendid page in our national history, and the men who have been identified with it in any capacity may rest secure in the patriotic consciousness of having served their country well.

Coming now to the second division of my theme, I repeat my remark at the outset that the promise in American shipbuilding at this time is quite as speculative as the possible progress was when progress began.

Taking up the naval prospect first, it may be granted that, according to the average of qualified opinion, our modern navy, including the latest ships just contracted for, is about half built or building. At all events, at least as much remains to be done as has been done, in point of number, tonnage, and cost of ships, before our establishment can reach the minimum status of readiness for war in time of peace. In what manner or to what extent from year to year the remaining half of the necessary programme will be executed, no one can foresee; but the fact that the destinies of American shipbuilding still hang largely on the future naval policy is as indisputable now as it was twenty years ago. If the policy proceeds with system and regularity, promise will continue to develop into progress, as heretofore. But any serious break in, or temporary abandonment of, the increase of the navy program would be quickly and disastrously felt by American shipbuilders; and not only by them, but likewise, in their train, by the almost innumerable throng of contributory or dependent industries. Here it seems proper to devote a word to the contributory industries. No one will dispute the assertion that a country is better off with such establishments as the Bethlehem Iron works, Carbon, Midvale, Carnegie's, Paxton's, the Illinois Steel works, etc., than without them. The progress of these industries during the epoch of naval reconstruction has kept even pace with that of shipbuilding. They had had, indeed, other markets, but the market which, above all others, has challenged their enterprise, invoked their ambition, and stimulated their advancement has been that offered by ship and engine building: Any blow disastrous to the latter would be equally and instantly destructive to them. A majority of one vote in congress against further prosecution of the prevailing naval policy would stop the 14,000-ton forging press at Bethlehem, silence the great rolls in Pittsburg, Cleveland, and Chicago, and check the hum of innumerable lesser wheels, as well as make grass grow in shipyards.

The promise in American shipbuilding at the commercial end is by no means secure. More than one shipyard in the United States could be named which is amply capable of meeting the whole probable commercial demand for new ships for the next ten years under existing conditions, so far as seagoing ships of, say, 2,000 tons register and upwards are concerned, exclusive, of course, of the lakes. This assertion may startle men not intimately familiar with the state of the industry, but every shipbuilder will accept it as the plainest of truisms.

It may be inferred from this that I consider the shipbuilding industry in America overdeveloped from the commercial point of view. Such inference would be wrong. The existing state of development as to facilities is no more than has been required—I might say, forced—by the demands of the navy. It is, therefore, normal and necessary. Hence the fault, if any, is not in overdevelopment of shipbuilding facilities. On the contrary, it is in the underdevelopment of commercial demand; and that underdevelopment is due to causes which can be removed only by betterment of the national policy in the direction of the merchant marine.

It must be borne in mind that we are dealing, so far as the ocean-carrying trade is concerned, with the fostered, encouraged, or subsidized merchant marines of England, France, Germany, and Japan, and, to a less, but still troublesome, extent, with those of the Scandinavian states, and Holland, whose cheaper labor and cheaper fare amount in the competition to more than a moderate subsidy. In this strife the American merchant marine is confronted with the problems of high wages and costly fare, without compensating conditions of any kind. A so-called subsidy law is in force; but it is so restricted in its application that but two steamship lines can derive any assistance from it, and even this assistance becomes pitiful when compared with the obstructive conditions that they have to surmount. In a word, the state of the American merchant marine is not calculated to cause any considerable or sustained demand for new construction in the seagoing classes, and hence, as a matter of course, there is little in that direction to offer promise to the shipbuilding of the future. This may not be a pleasant, and certainly is not an exhilarating, theme for a shipbuilder, and it will probably add nothing to the sum total of the prevailing aspiration for a renewal of prosperity. Not until the rehabilitation of the American over-sea commerce is made a fixed national policy, elevated above all questions of party expediency, in the carrying out of which our diplomats and legislators shall be in hearty accord, can a healthy demand be created for ocean-going ships. Almost from the foundation of the republic we have been piling up treaties with almost every nation, the effect of which has been, and is, to reduce our merchant marine, alone of all our great national interests, to an even footing with the cheap labor nations of the old world. The trouble lies more in our diplomacy than in our legislation. It seems that we are full of discrimination in favor of any and every one of our great industries, except that of ocean traffic. But, whenever it is proposed to discriminate in favor of that, the archives of the department of state open, and belch forth vetoes in the shape of forgotten treaties, in every one of which our birthright on the sea has been bartered away. In population, judged by the standard of average enlightenment; in area, judged by the standard of available productivity of soil; in wealth, judged by the standard of active capital and mobile resources,—we are undoubtedly the greatest nation on the earth; but the instant we touch salt water in the carrying trade, our treaties throw us upon the tender mercies of the humblest, as well as the proudest, states of Europe. The intelligent application of the proverb, "charity begins at home," would mean much to our commercial interests on the ocean.

From these deductions it is apparent that the existing state of our over-sea merchant marine is due to deep seated and fundamental causes which cannot be adequately dispelled by any mere "Be it enacted." The conditions which confront us are epochal, not accidental. We have been supine, while others have been active; we have let our interests take care of themselves, while others have taken care of theirs; and we are now confronted with the inexorable result of our shortsighted and unpatriotic folly.

The task of national rescue from these sad and humiliating conditions is an herculean one. Whether or not our statecraft and diplomacy of the future will prove equal to it is something beyond my ken. But it is perfectly plain that persistence in the aimless, purposeless, and nerveless policies of the past not only will not effect the desired rescue, but must deepen the degradation.

We can find encouragement in one most important direction, despite this gloomy outlook. Causes already delineated have promoted the shipbuilding industry to a point where quality of output being duly considered, it can compete on even terms with any and all comers. The disparity in first cost between American and British built ships of like classes has been so nearly eliminated by our recent phenomenal progress in the art, notwithstanding our higher wages, that it has ceased to be an important factor in the situation. Merchant and steamship companies can now, all things considered, procure American built ships as economically as ships of English build. This, of course, refers to the higher classifications. Hence the American shipbuilder is ready to do his share towards resurrection of our seagoing merchant marine on the most favorable footing. But, as yet, the disparity between this country and England in the matter of cost of operating ships of like classes exists in full force—in sufficient force to be practically prohibitory. For this reason, and for this alone, the facilities of the American shipbuilder are not to any considerable extent, or with any encouraging continuity, called into requisition by the American shipowner. This is not because the American shipowner does not desire new ships, but because, under existing conditions of competition with rivals receiving substantial aid from their respective countries, he could not operate them profitably if he had them.

Thus the reader will perceive that, no matter from what point of view the situation is surveyed, or no matter at what admitted point of fact the train of reasoning may begin, the conclusion arrived at is always the same,—namely, that the future of American shipbuilding in any large sense depends upon the future of American traffic over sea; and that the future of over-sea traffic is wholly in the hands of our national statecraft and diplomacy. So, while viewing the progress of American shipbuilding with exultant pride, let us look to its promise with fervent hope.

PRESENT STATUS AND FUTURE PROSPECTS OF AMERICAN SHIPBUILDING.

BY JOHN FRANKLIN CROWELL.

[John Franklin Crowell, expert agent of the United States industrial commission and expert on internal commerce, bureau of statistics, treasury department; born Nov. 1, 1857, at York, Pa.; was graduated from Yale in 1883 and later studied at the University of Berlin; he was principal of Schuylkill seminary, Fredericksburg, Pa., in 1883–4 and 1886–87, in 1887 becoming president of Trinity college, North Carolina, remaining there until 1894, when he was chosen head of the department of economics and sociology at Smith college, Mass.; in 1898 he traveled and studied in Europe, and the following year was lecturing and writing on sociology and economics and sociological questions; in 1900 he accepted his present government position, and in 1903 was the lecturer on international trade and commercial geography at the Columbian university; he is the author of The True Function of the American College, A Programme of Progress, Taxation in American Colonies, The Logical Process of Social Development, The Distribution of Farm Products in the United States, The Iron and Steel Trade in the United States, and kindred works, in addition to economic and social studies published in the reviews.]

Not since the early fifties has American shipbuilding enjoyed so large a measure of prosperity as that of to-day.

The cause of this prosperity is easily explained. For many years prior to 1898 the industry languished, and the carrying trade, which had been stimulated by artificial "booms," was greatly depressed. Dividends on marine property were small. The earnings were swallowed up by heavy expenses. Losses by sea were not made good. The actual number of coast ships was considerably decreased.

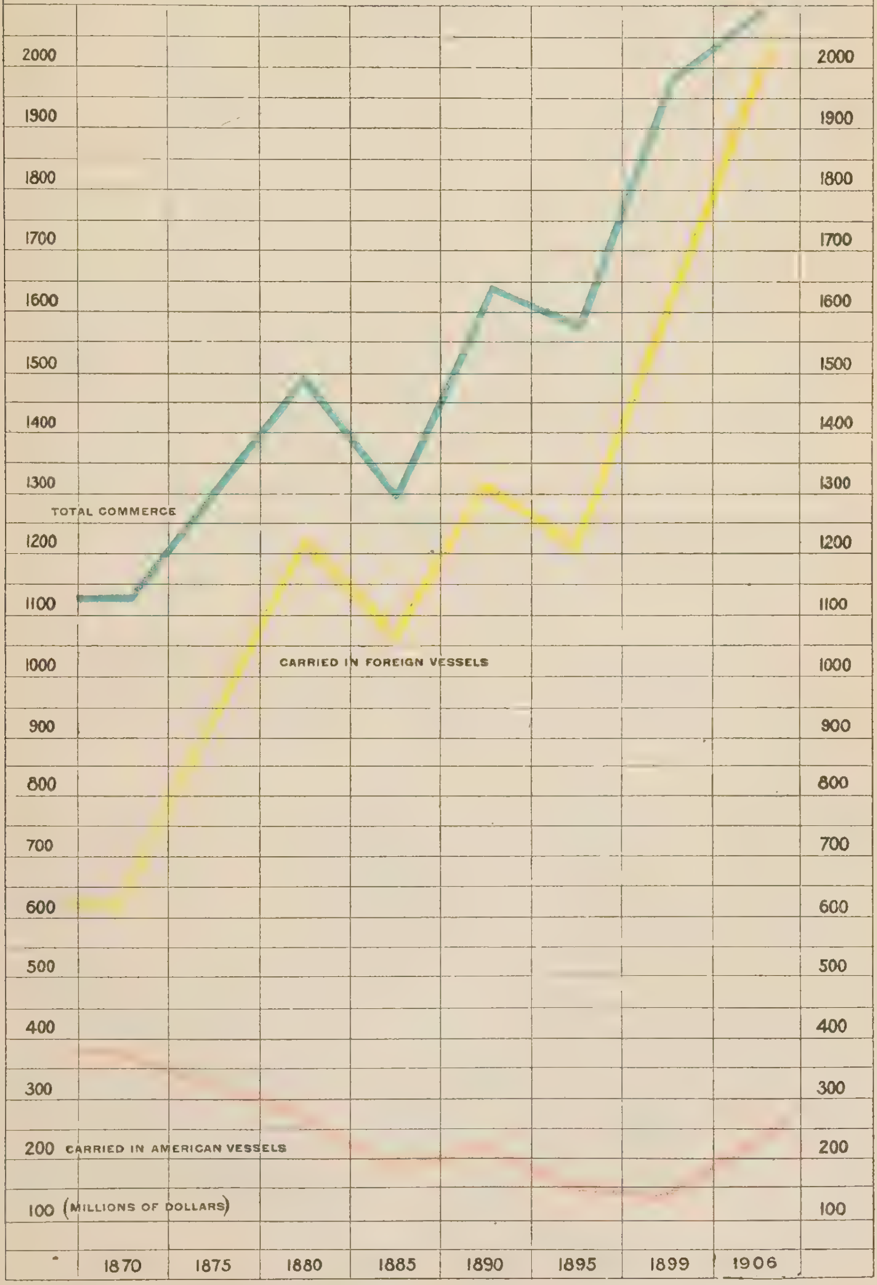
Just at the time when the maritime prospect seemed darkest the extraordinary development of Alaska began. It was found that the number of vessels available for this profitable traffic was far below the demand. Every vessel that could be procured was chartered for the Alaskan trade. High charters caused many to be withdrawn from the coast carrying trade, and a considerable scarcity of vessels for ordinary requirements began to be felt. Then came the revival of the Oriental trade, in which the Pacific shipbuilders found another pressing demand for their output. There appears from trade returns to be no abatement at any point. Owing later to South African conditions, the call for ships was still further improved. Besides these local evidences of prosperity the shipbuilding talent of the nation still holds the world's pennant in the making as well as in the management of pleasure craft, which the growth of private wealth has enabled an increasing proportion of our citizens to enjoy. Largely for this and other purposes the United States has always built ships for sale to foreigners. Since the civil war the annual tonnage of all kinds sold to foreigners has ranged from 10,000 to 80,000 tons in round numbers.

As yet the main demand for the product of our shipyards, with the exception of a few war vessels ordered by foreign governments, has come from the necessities of national defense and the requirements of our domestic development. But the progress of the iron and steel industry in this country, the necessity of finding foreign makets for our surplus manufactures and the extension of railway control over lake and ocean transportation, have all, among other causes, contributed to inaugurate a new era in the making of ships. Surplus capital is again going down to sea in ships. Now for the first time in our history is shipbuilding being organized on an extensive scale in the consolidated companies on the lakes, on the individual enterprises on the New England coast, on the Delaware river, the Chesapeake bay, the bay of San Francisco, and the Puget sound. On the western rivers the output is still comparatively small, though not by any means losing ground.

Shipbuilding to-day in the United States stands on an entirely different basis compared with the position it occupied ten or twenty years ago. It has changed greatly as an industry in its relation to other industries, to the investing public, to commerce and to governmental policy. One does not readily realize how rapidly this branch of industry has grown in financial strength and in commercial value. Within a decade the capital invested has nearly trebled, wages earned have likewise doubled, and substantially the same may be said of both the expenditure for shipbuilding materials and of the value of the products of our shipyards. The number of establishments is about stationary.

SHARE OF FOREIGN COMMERCE OF THE U. S. CARRIED IN AMERICAN AND FOREIGN VESSELS RESPECTIVELY,

1870-1906



The annual increase in our merchant marine represents the measure of demand for ships under the national flag. For the fiscal year ending June 30, 1901, this increase was 6.96 per cent over that of the preceding year. This rate is the highest since 1855. From the latter date to the present time the tonnage figures show a series of slow recoveries and abrupt reactions in the demands of our merchant marine upon the shipyards. As late as 1886 more than one-third of the annual increase in tonnage was sold to foreigners. Spasms of promise have so frequently been followed by collapse that, in spite of our growing foreign commerce and our increasing importance as a naval power, our shipbuilding has concerned itself almost exclusively with meeting the requirements of our coastwise and interior commerce.

This is well brought out by a comparison of the documented tonnage in foreign and domestic trade and in fisheries on June 30, 1861, when the United States still had prominent rank in foreign trade, with that on June 30, 1901, when the total tonnage was nearly equal to that of forty years before. The table shows that the coastwise trade has been absorbing our ships, and now utilizes four-fifths of the total tonnage of the country.

DOCUMENTED TONNAGE OF THE UNITED STATES.
[From Report of Commissioner of Navigation.]

	1861. Tons.	1901. Tons.	Difference. Tons.
Foreign trade	2,496,894	879,595	—1,617,299
Coasting trade	2,704,544	4,582,683	+1,878,139
Fisheries	338,375	61,940	— 276,435
Total	5,539,813	5,524,218	— 15,595

The reasons for the transformation implied in these figures are historical. From 1830 to 1890 our problems were essentially internal. Most of them for most of the time were intensely exacting. It was not that national lethargy had dulled the desire for ships, as some would have us think. That analysis is economically false to facts. For the time being our hands as a nation were full—full of work as honorable as shipbuilding and ocean commerce, and far more urgent and fundamental. The dominance of internal affairs over foreign commerce began to appear by the end of the first quarter of the century. Even as early as the war of 1812 our national problems gradually ceased to be maritime and became territorial. In 1824 a group of New York shipowners protested to congress against the policy of economic isolation, by which capital and labor were induced to desert ocean commerce for the more remunerative pursuits of internal development. Only so long as that policy was in doubt did our ships maintain a foremost rank among maritime powers. As soon, however, as the "American policy" of economic isolation became continuous, then capital and labor, employed in shipping, and consequently in shipbuilding for ocean trade, found themselves placed on an entirely different basis of earning power compared with that portion of the national capital and labor devoted to internal development. Capital devoted to shipbuilding for the sea trade had to earn returns under the stress of competition in the open world's markets, while the products of capital and labor within the national limits were sold in the national market, within which the prevailing rate of returns has always been higher than in the international market. On footings so clearly unequal, in a period of economic activity when the demand for labor and capital as a rule exceeded the supply, it was inevitable that the decadence of our merchant marine should coincide with the development of our domestic resources.

Now again the national interests have, by the logic of events, become maritime. Meanwhile the economic life of the people has also become more complex and comprehensive in its needs. From being primarily agricultural it has become industrial and then commercial. It is all of these that call for ships. Changes in our commercial relations with the world market have greatly modified the national attitude toward shipbuilding. The gains of our exports upon our imports during the latest decade have thrown upon the American producer the burden of finding over-sea markets for a growing surplus.

Growth in volume of ocean commerce of itself introduces a new element into the question of the national demand for ships. By transferring an increasing proportion of the national surplus to the custody of the seas, to find markets, it calls for a more complete control of carrying agencies by those directly responsible for national prosperity. Private and public interests seem to coincide in requiring that no nation of an exporting rank such as is now held by the United States should delegate its maritime commerce to its national rivals.

The maritime arm of the distributive system, on which we are dependent for finding and holding such markets as our surplus needs, thus becomes part of the more complete commercial equipment which progress from an agricultural to a commercial nation has forced upon us. Until recently the emphasis was put on the home market in national discussion. Now we speak as world merchants and as world financiers. These comprehensive aims all tend to force surplus capital into a merchant marine, now that other channels of investment are no longer prejudicially profitable compared with shipping and shipbuilding. Between the home market and the world market the bridge of a national merchant marine is a logical necessity.

The present status of American shipbuilding has still further to be looked at from points of view that are peculiarly its own. The industry as it stands now is clearly connected in its development with the naval policy of the national government. This policy has resulted in calling into existence more shipbuilding plants operating on a larger scale and with more permanent conditions than the commercial demand succeeded in doing. It has drawn together mechanical equipment and engineering talent of a superior order to execute its contracts. It has distributed these contracts among shipyards on the seacoasts of the Atlantic and the Pacific in such a way as to equip every one of our great oceanic inlets, excepting those on the gulf coast, with superior shipyards. It has, by insisting that its vessels should be the products of

American skill and material, and of American model and design, attracted investing capital and constructive labor. All of these have helped to lay the foundations of a new order of things. It is true that the influence of naval policy is usually quite indirect in its effects on commercial shipbuilding, but the connection has been none the less promotive of industrial efficiency in this field. Competition among shipyards for governmental contracts has taken a wider range and has been perceptibly keener with each successive award. Besides this general result, the high standard of workmanship required on governmental work has improved the grade and quantity of mechanical ability as applied to the building of steel merchant ships especially. Possibly there has been some disadvantage in turning a force of workmen from governmental work, where extreme carefulness is required, to commercial work where so high a degree of finish and nicety are not essential. But in the long run it cannot be disputed that the wholesale building of warships has helped to create large plants out of small ones and to develop the large ones to a point at which it is no longer industrially necessary to look to foreign shipyards for our merchant fleets of the future. A still more direct effect of naval policy upon commercial shipbuilding is seen where the mercantile auxiliaries constitute a feature of the merchant marine subject to naval service in time of war.

From what has already been said it is plain that our commercial prosperity has put us face to face with the shipping question. At present our financiers who underwrite our commercial organizations are buying foreign ships in the effort to bring railway and ocean rates of freight under common control. If financial considerations are allowed to govern in these consolidations of distributive agencies on land and on sea, as they undoubtedly will, it is not any longer a question as to where the ships will come from. One thing is certain, namely, that hitherto the ocean trade has not been in the habit of coming to the United States for its ships. Now, however, that the demand for the establishment of a national merchant marine is heard with increasing insistence, the question of the capacity of the American shipyards to supply the ships is foremost. Can American shipyards build merchant ships at a cost that will enable shipping interests to operate them in open competition with vessels from the older establishments of Great Britain or even with those of Germany? The answer to such a question involves comparisons very difficult to make on a common basis. The methods of work, the differences in design, cost of materials, wages, superintendence, interest, depreciation and insurance, expenses of operation and other items including the advantages of production on a large scale, have to be taken into account. One fact seems to be established beyond doubt, namely, that the first cost of an American built ship is greater than that of a British built ship of exactly the same size, dimensions and speed. The same seems to be true of German work. On this basis of capital cost, the depreciation, interest and insurance would probably amount to fifteen per cent per annum as fixed charges other than direct expenses of operation. If the American built vessel cost $1,846,800 and the British built vessel cost $1,419,120, these fixed charges would be respectively, $277,020 and $212,868, leaving the British built vessel with an advantage of $64,152 annual outlay on first cost. These figures are taken from actual examples of construction cost in leading British and American shipyards, to each of which identical contracts were awarded for vessels of the same plan and type. If this single instance be not taken as conclusive evidence on the subject of relative cost, it is necessary to go farther to show that in dealing with the worldwide problem of shipbuilding for the ocean trade, the American yards and the European yards still stand on a quite different basis as competitors.

It would probably not be disputed that in bridge building Americans easily lead the British and the Germans. And the unanimous opinion would be that it is the result of our experience during a half century of bridging streams under such a variety of conditions as to make us masters of almost any possible problem that may arise anywhere else in the world. Precisely the same may be said in explanation of the success of British and the relative failure of American shipbuilding. No field of commercial and industrial investment has been more liberally supplied with capital by the banks and the investing public than the shipbuilding and shipping interests of Great Britain. On the other hand, no American interest has been, until recently, so completely ignored as a rule by banks and investors generally as these phases of national enterprise—shipping and shipbuilding. Until within a few years the American banker considered shipbuilding as an industry lying without the pale of legitimate investment. He belonged to a generation which knew nothing of the subject and cared less about it, when this field of investment was called to his attention. The history of American shipbuilding, like that of American farming, for the past fifty years is one of brave struggle to maintain an industry with a minimum of capital and hence a maximum of cost accompanied by the hazard of periodical depression. Financially it has been the most neglected of all our national industries.

Compare this with British shipbuilding, of which an experienced shipbuilder on the Pacific has said that it is the result of the very things we have not—prolonged and wide experience gained by shipowners and sailors, the embodiment of the principles of designing to meet universal conditions, the solution of problems worked out by the joint labors of naval architect, machinist, registration authorities and public criticism. American shipyards are still in the stage of adaptation to local conditions for the most part. On the lakes, within the limits of the local traffic requirements, the problems have been worked out as they arose with a high degree of success. Likewise on the seaboard coastwise trade has preoccupied the attention of constructive progress, so that the cost has been brought within the limits of fairly profitable operation. But for the far greater problem of construction at a cost that will warrant investors in entering upon ocean competition, our shipyards have not yet proved themselves masters of their part of the situation.

In shop equipment American shops seem to excel in small tools and lifting appliances used in the handling of material. There are no such complete and economical methods of handling tools and materials by electricity anywhere in

Europe as those of the Eastern Shipbuilding company, at New London, and the New York Shipbuilding company, at Camden, N. J. In large tools the American shop does not appear to be any better off. In engine building, as well as in the construction of the hull, the system of piecework is reduced to such a degree of precision in English shipyards that it is known or easily ascertained just what part of the total labor cost of a ship is to be charged to these parts of the work. Then there is a settled method of determining compensation for unit of product, while here no such uniformity has ever been agreed to. In spite of our advances in standardization in some directions, particularly in stationary engines, no such a complete system has been arrived at in the building of marine engines as that in British practice, where every part of an engine is gauged with precision to test the accuracy of the workmen's operations and the precision of the mechanics and tools used, so that without setting up the parts they may be sent to the ends of the earth with absolute certainty of fitting.

A comparison of foreign and domestic conditions leads to the impression that our shipbuilding industry is not evenly developed. In parts it is weak, as, for instance, in the development of standards of uniform cost of work. Higher wages per diem than is paid abroad still cover a multitude of sins of omission to organize work on the basis of results accurately measured by uniform methods. In this direction there is room for development, if shipbuilding is to be brought up to the standard of organization in other industries. It has been stated that a standard gauge system would reduce the cost of engine erection by as much as 50 per cent. Under American methods the same authority estimates that the labor cost on the hull of an average ocean going freight and passenger steamer, in an American yard, is 25 per cent more and the machinery 50 per cent more. Yet it is conceded that in point of quantity or output, in skill, in design, in handling machinery and in management our working force is superior.

Possibly the main reason for the difference in cost chargeable against our work lies in the variety of work which a shipyard has to do to keep itself going in the United States. Foreign shipyards have a continuous volume of work of a similar character, while our own yards work constantly on dissimilar designs and diverse specifications, so that it is the exception, rather than the rule, that the workman becomes familiar with his work from repetition of it in one ship after another. Almost every governmental order includes a more or less radical departure from previous specifications, so that naval requirements have hindered rather than helped toward reduction of cost by promoting similarity of type in construction. It is a matter of common knowledge that new types increase cost while standard types decrease cost. Protest after protest has been recorded against this mania for differentiation in type, but with little avail. In recently built merchant ships, both on the lakes and on the seaboard, the duplication of designs has become a matter of more frequent occurrence.

Another element of weakness in the shipbuilding situation in the United States is the large number of small and half equipped yards and the small number of well established ones. Excepting the Cramp shipyards, at Philadelphia, and possibly a few of lesser note, the United States has never had a plant which devoted itself exclusively to this business without sooner or later meeting with financial failure. This is the record of the past twenty-five or thirty years. When demand for ships fell off the small yards have gone out of business for the time being. When prosperous trade called for more ships these very yards were given the contracts. In this way the burden for conserving and developing shipbuilding skill fell almost wholly on the few yards which remained in the business all the time. The wonder is not that we cannot build ships so cheaply as they are made in foreign yards, but that we can build them as well as we do under such conditions. The readiness with which a new plant can be called into existence, or an abandoned one revived, to get contracts is one of the marvels of this industry to foreigners.

It would not be fair to shipbuilders to omit one of their great difficulties in their attempt to develop their industry, a difficulty, moreover, which lies beyond their power to remedy under existing conditions of organization. No single element has been more embarrassing than the fluctuation in the prices of steel plates and angles. The price of shipbuilding steel has been known to increase 250 per cent in four months. This has no doubt somewhat abated, but on so high a level of prices as not to encourage the domestic manufacture of steel ships. British builders have the advantage of the steadying influences of the world's competition on prices of steel materials. For that reason they need never fear American competition in this field under existing differences in the cost of structural material. The high prices of steel material at home have no doubt something to do with the fact that on the seaboard 43,557 gross tons of wooden schooners and steamers were built last year, compared with 73,374 gross tons of steel steamers.

Nevertheless American shipbuilders and architects have made wonderful progress within a decade. They have gathered together the experience of the world on the subject. They have worked diligently and often unnoticed at every phase of the problem. They have demonstrated their ability to design and construct, in the most satisfactory manner, with regard to time and efficiency, standard types of vessels for naval and mercantile service. Among the distinct contributions of this country to the making of ships should be mentioned the application of electrical power to the operation of machinery tools, cranes and other hoisting and handling methods, and the invention of small power tools, such as riveting, chipping, caulking, and drilling appliances. All these advances lie in the direction of reduction in cost for unit of output. From this point of departure in further development two tendencies are at work. Within shipyards a more economical organization of the productive processes is going on to reduce costs by eliminating the unessential and by putting the emphasis on the essential elements of outlay. Such a process is slow and its results are not so quickly diffused from plant to plant as might be expected, notwithstanding the splendid spirit of comity among rival shipbuilders. The other tendency lies outside of the industry itself in the reduced cost of making shipbuilding materials, and in the growth of the demand for ships as a necessary extension of our distributive system. The problem of reducing the first cost of ships to the European level will have been solved when the annual output of our shipyards is five times what it now is. It is all a question of the volume of demand required by national development. The joint outcome of these two tendencies is inevitable. Meanwhile, in spite of all drawbacks the outlook is not only encouraging, but inspiring. Our national outlook has shifted to the sea politically, geographically, and commercially. With this fact once fixed in the national consciousness clearly enough to see its connection with our past history and our present opportunity, it is not probable that any time will be lost in higgling over the terms on which these instruments of maritime power shall be called into being.

THE COMMERCE OF THE GREAT LAKES.

BY RAY STANNARD BAKER.

[Ray Stannard Baker, author and associate editor of McClure's magazine; born April 17, 1870, at Lansing, Michigan; was graduated from the Michigan Agricultural college in 1889, and studied law and literature in the University of Michigan; he has been an extensive traveler and an equally extensive contributor to the English and American magazines on various matters, particularly a series on the Great Northwest and one on the Great Southwest; he is the author of The Boys' Book of Inventions, Our New Prosperity, Seen in Germany, etc. The following article is from the Outlook and is published by special arrangement.] Copyright 1902 by The Outlook Company

Nothing so touches the imagination of the foreigner who visits the United States, especially if he be a ship loving Britain or German, as our back yard seas--the Great Lakes. I shall not soon forget the astonishment expressed by a ship acquaintance, an Englishman, upon locking through the great canal at the "Soo," where some dozen huge and, to him, outlandish vessels were lined up awaiting passage. He had seen New York harbor and the Hudson, Buffalo and Niagara falls, and they had not disturbed his British equanimity; but when he reached the channel at St. Mary's straits his monocle came down, so to speak. Here we were in a splendid vessel, the very counterpart of an ocean greyhound, threading without a pilot a long, tortuous, ship thronged passageway, first to the right, then to the left, here apparently just grazing a sluggish log of a barge, there swerving almost over a danger buoy—seamanship as pretty as one will see anywhere in the world. All about were matchless hills now bright with early autumn, and little jewels of islands set in the clear water, with white sails flashing in and out among them. All day he had not stirred from the deck, and now that the ship was rising nobly in the lock, giving a clear vision of the extent of the shipping here gathered, he exclaimed:

"I did not know you had anything of this sort in America."

"Most Americans don't know it, either," I answered.

And truly the great lakes furnish much food for wonder to the traveler who is familiar only with ocean transportation.

Within less than fifty years the lakes have developed a peculiar and striking life of their own, not remarkable merely for the typical American qualities of bustle and bigness, but possessing a diversity and picturesqueness quite unique. No great department of American activity has acquired a more distinct individuality than this, and none, indeed, is of more notable importance in our commercial and industrial development.

One of the things which impresses the stranger on the great lakes is the significant and perhaps prophetic absence of any evidence of war craft; not a single frowning gun, not a turret, not a navy flag, is ordinarily to be seen, though, as a matter of fact, there are two or three harmless little armed vessels on the lakes, maintained for the same reason, apparently, that prompted the Irishman to wear spats, "to kape up the stoyle." No; the lakes have room for business only, and though the commerce of two nations there mingles, a simple agreement made nearly eighty-five years ago has disposed of nearly all the expense and danger incident to the maintenance of armed craft, and with them of huge fortifications. One cannot but look upon this condition as prophetic of the time when other agreements may also clear the oceans of warships. It may be said, however, that while no mariner of the lakes wishes to see more warships navigating his waters, the shipbuilders, who are many and enterprising, are more than anxious to help build warships for ocean use, even agreeing to construct them in sections, float the pieces down the St. Lawrence, and put them together again in deep water.

Another sight, strange and impressive to the foreign visitor, is the supremacy on these seas of a single flag, and that a flag not so widely familiar on the greater ocean courses. Of the hundreds upon hundreds of lake vessels, nearly all fly the stars and stripes, only about 10 per cent of the whole number bearing the Canadian colors. No other nation is represented, though the commerce is far greater than that of the ancient European fairway, the Mediterranean sea.

The craft, too, strike the visitor familiar only with salt water vessels as strange, picturesque, ugly, intensely utilitarian. For the lakes have developed highly differentiated types of their own. I think one is most surprised by the great size of many lake vessels, comparing favorably, as they do, with the largest of ocean-going freighters. One has an impression that shallow water, crooked channels, canal locks, and river mouth harbors preclude the use of such vessels; but while all these hindrances exist, the inventive acumen and energy of the lake shipbuilder and the industry of the harbor engineer have been able to overcome all these difficulties, and vessels from 400 to 500 feet long are now by no means uncommon. While a few passenger ships are as graceful in line and as complete in equipment as an ocean greyhound, most of the craft, big and little, impress the stranger as being hopelessly awkward and ugly, but with the ugliness of high utility. A strange sight is the whaleback, an invention of the lakes, a long, blunt-ended steel hulk with rounded gunwales, which, from its appearance and its manner of rooting and rolling through the water, has earned among lake sailors the highly expressive name "pig." But in commerce which demands of its vessels the largest possible "emptiness" commensurate with safety, the whaleback is a valued adjunct, for its huge steel shell will hold an enormous cargo. Indeed, all lake vessels possess a much larger freight capacity in proportion to their size than ocean-going vessels. The voyages being short, it is unnecessary for them to take on so much coal or provisions, and many of them, indeed, are nothing more than huge, all but empty barges designed for towing. It is not unusual to see several of these hulks roped together and towed by a steamer, thereby enabling a single engine and ship's crew to transport an immense tonnage of freight and to do it at a cost unbelievably small. To the ocean traveler these rows of vessels constitute a most unique and unusual sight.

The fully equipped vessels are also built on plans differing widely from ocean craft, appearing abnormally spread out and wholly lacking in the jaunty compactness of the salt water freighter. The machinery and coal bunkers are placed far astern, and the crew's quarters far forward, so that if the captain wishes to look at the machinery he must take a sort of afternoon stroll the full length of the vessel to do it. Weighted thus in the stern with engines and coal, the prow of an empty vessel sometimes shows far out of the water, reminding one of nothing so much as a Lake Superior birch canoe, its Indian owner sitting paddling in the stern with the prow lifted entirely out of the water. But this arrangement is highly serviceable because it leaves the whole waist of the vessel open and free, so that a load of wheat or iron ore can be dumped in with the least possible expenditure of time or energy.

The lakes possess many other odd craft, not the least among which are the huge railway ferryboats, many of them plying across the straits and rivers, as at Mackinaw and Detroit, bearing safely and swiftly entire passenger or freight trains—often as many as thirty loaded cars—thus closing the gap in the transcontinental railroad lines. Indeed, ferries have now been built for braving the lakes themselves, making nothing of a trip from side to side of Lake Michigan with a heavy load of cars. Another development is the ice crusher of the "Soo," a powerful craft built to force a channel in the ice which sometimes blocks the passage between Lake Superior and Lake Huron before the fleet has all passed. It is nothing unusual to see the ice crusher forging its way noisily through three feet of solid blue ice, with a long line of frost coated vessels following in its wake and escaping to open water. By this means the enterprising shipowner sometimes extends the open season several days and earns the profits of another cargo or two. For at best, like no other widely navigated body of water in the world, the lakes are open only about two hundred and twenty-two days in the year, and all the enormous traffic is ice bound and quiet during the winter. Yet the shipowners utilize even the winter months. After the last voyage in the fall scores of large vessels crowd into the rivers and harbors, especially at Chicago, where they are filled with wheat or other freight and become floating storage warehouses, an adjunct to the elevators, at the same time being prepared the moment navigation opens in the spring to sail eastward with their cargoes.

The sailing ship, almost invariably schooner rigged, is still largely in evidence on the lakes, engaging chiefly in the lumber trade; but the day of sails is passing, and the canvas of the schooners grows blacker every year with coal smoke.

Not a few vessels of the barge order, ordinarily towed, are partially rigged with stumpy masts and sails to assist in favoring winds, or, in case the barge is cast adrift, to enable it to find its way lamely into port. A few old fashioned side-wheel steamers, broad and flat and ugly, used largely for passenger excursions, are reminiscent of the Mississippi river in its palmier days.

Few people possess any idea of the immense volume of this lake business—a vast shuttle race over twelve hundred miles long in its greatest course (from Duluth to Ogdensburg), so thronged with the shuttles of commerce that there is rarely a time on any of the lakes when the mariner cannot see the hulks or the smoke of many ships within the horizon. The tonnage owned on the lakes is greater than the entire merchant fleet of any nation in the world except Great Britain and Germany. In steam tonnage the lakes nearly equal the German empire, though the individual vessels will not average as large and costly. Nearly a third of all vessel tonnage owned by citizens of the United States, including all our much prized coastwise traffic on both oceans, together with our foreign shipping and our internal river business, plies the waters of the lakes. One-eighth of the commerce of the United States passes through the "Soo" canal—lake vessels carrying upwards of 40,000,000 tons of freight annually, valued at $500,000,000. It is an oft-repeated comparison, that of the canal at the "Soo" with the Suez canal, showing how much greater is the tonnage that passes St. Mary's locks in the nine months of open water every year than that which passes the Suez canal in a whole year—a comparison legitimate and striking enough, despite the fact that the Suez cargoes, composed largely of costly manufactured goods, are more valuable than the bulk raw materials transported through the American canal.

Another point of interest lies in the fact that practically every ship on the lakes has been built in lake shipyards, all of which—in Chicago, Cleveland, Superior, Detroit, and elsewhere—possess a high efficiency of equipment and are conducted with boundless enterprise. During recent years every yard has been crowded to its fullest capacity in turning out new vessels for the lake service, nearly all being the latest models of steel steamers. And it is lake capital and lake energy that are behind the shipbuilding enterprises, and the vessels themselves are largely owned by residents of lake cities. During the last few years, there has been a marked tendency toward the formation of great fleets of vessels under a single ownership. The United States steel corporation, for instance, which is by all odds the most deeply interested of any concern in the welfare of lake commerce, owns no fewer than one hundred and fifteen of the finest lake freighters, employing this huge fleet for bringing iron ore from the Lake Superior mines to the mills of Pittsburg, Chicago, and other centers of steel production. All these vessels are managed by a single department, headed by a vice-president of the great corporation, and the vessels are kept running with all the precision of a railroad system, being directed by telegraph and telephone, thereby rendering possible notable economies in the company's business. Other fleets engage chiefly in wheat carriage, others are devoted to lumber, others to coal, and there is still a large body of what is known as "wild" tonnage—that is, vessels ready to take a cargo anywhere at any time.

But the development in the vessels themselves, while striking enough, is by no means the most marvelous feature of lake commerce. The secret of successful water transportation lies not so much in the navigation of loaded vessels from port to port, though this feature of the work appeals most strongly to the lay imagination, but rather in the loading and unloading of cargoes. It is in these respects that expenses roll up and that precious time is wasted, and here it is that the lake shipowner has shown his greatest genius. It is well within the truth to say that nowhere else in the world has the art of filling and emptying vessels reached the state of perfection that it has at Duluth, Conneaut, and Buffalo.

Iron and steel making is said to be the basic industry, the industry upon which all others rest. Now, the important feature in iron and steel making is that of transportation; in other words, the capacity of getting the coal and iron ore together cheaply. Cheap transportation means cheap steel, and cheap steel means supremacy in the world's markets—a supremacy which the United States has now attained. It will be seen, therefore, how important becomes the matter of loading and unloading the vessels of the lakes. If it were necessary to trundle iron ore aboard ship in wheelbarrows, our steel industry to-day would be in its infancy. But so perfect has become the machinery of shipping that from the moment the iron ore leaves the mines of the Lake Superior country, until it issues from the steel mills in the form of rails and other products, hand labor scarcely touches it, every step in the long process being the work of cunningly devised machinery. Think of mining iron ore and loading it on cars at a cost of five cents a ton! The ore is not even shoveled or blasted, but scooped up by a big steam bucket from the hillside and dumped into steel cars with openings in the bottom, so that upon reaching the docks a turn of the wrist will send the entire load rushing downward into a long chute the end of which rests in the ship lying ready below, or else debouches into a storage pocket in which the ore is retained until a ship is ready. And such docks as these are! At Duluth they look like stupendous black bridges yet unfinished, one end resting on the land, the other reaching for the other side of the harbor. They are so huge that the greatest vessels lie hidden alongside them, and the ore trains on top look like rows of children's blocks. A single one of these docks with its approaches at Duluth cost nearly $1,000,000, and the total length of all the ore docks in Lake Superior exceeds five miles. By this system of car dumping the largest steamers, holding from five to eight thousand tons, can be loaded in three or four hours, at a cost of less than three cents a ton.

Wonderful as is this system of loading, still greater are the achievements in unloading. At the ports of Lake Erie a long steel arm dangling at the end of a bridgelike crane reaches down with almost human precision and takes handful after handful of the ore, tons at a time, lifts it out of the vessel hold, swings it majestically to one side and drops it on the mountainous stock heaps, whence in good time it is loaded on cars for transportation to the mills of Pennsylvania. I think no sight in the world of machinery, save in the steel mills themselves, is more awesome than the mighty perfection of these ore unloaders. Nowhere shall you feel more like bowing to the greatness of human genius.

Thus the lake shippers are able to transport from Lake Superior to Lake Erie in nine months of open water nearly 20,000,000 tons of ore, paying a freight rate of some sixty cents a ton—by far the cheapest freight rate in the world. In other words, it costs for lake freight 1.13 cents to transport a ton for a mile, or about a quarter of the cheapest railroad freight.

Iron ore transportation constitutes the largest part of the lake commerce, but there is also an immense volume of wheat shipped from Duluth, Chicago, and Milwaukee to the east, mostly to Buffalo. Here also notable improvements have been made in loading and unloading, so that a ship can be filled in an hour or two, and emptied in half a day.

At one end of the lakes, the western end, lie the great fields, forests, and mines of the country, at the other end the factories and mills; the lakes are the natural connection between the two. From the western end branch the transcontinental railway lines, reaching to the Pacific and connecting with ships to China and the Orient; from the eastern end stretch the lines to the Atlantic coast and thus to the crowded shores of Europe. The lakes are the cheap, easy link between the two; and it would be hard to exaggerate the importance of the part they have played in the development of the whole country. Raw materials in bulk—iron, ore copper, salt, lumber, grain, and so on—naturally flow eastward along the lakes, while ships bound west carry the completed products of factory and mill. Coal is the greatest exception—a raw product, mined in the east and flowing westward, so that many ships that come down loaded with ore, etc., go back loaded with coal. By this means the give and take of trade is maintained and transportation is cheapened. Another movement little mentioned but yearly growing more important is the translake shipping from the United States, the country of progress and manufactures, to Canada, the country of undeveloped resources and conservatism. To-day we ship to Canada nearly twice the value of goods shipped by the mother country, Great Britain, and the Canadians send us a very large proportion of their exports.

No consideration of the commerce of the great lakes would be complete without mention of the hardy lake mariner. And here, too, new environments have developed a peculiar type, as different from the typical "salt" as the waters of the lakes are different from the seas. One can understand how the ocean seaman might naturally look with contempt on the navigator of the "fresh-water ponds," but it is surprising to find that the lake mariner expresses equal contempt for the "salt." And many a "salt," tempted by higher wages and better treatment, has come to the lakes only to have his seasoned stomach upset in the first sharp squall, much to the amusement of the lake men, and to find the work so much livelier than that of the ocean craft that he has been willing enough to go back to the sea. For storms on the lakes are sharp, short, and violent, and the harbors, locks, and rivers make a great diversity of work—and hard work, too. Instead of shipping for a voyage and standing the possibility of being "shanghaied" at ports, or abused during months at sea, the lake mariner, engaged for the season or by the month, reaches port often, is industrious and sober, has a family at the end of his run, and makes enough in nine months to permit him to enjoy his winter vacation if he cares to do so. The officers, while men of marked intelligence, have little knowledge of scientific navigation, such as is necessary to set a course at sea, their runs being short and never far from a lee shore; but they are past-master pilots, deeply learned in the art of wriggling through crowded channels, making narrow harbors in high seas, and gliding up to docks and into canal locks with scientific accuracy. Also, they are fine fellows, bluff, hearty, full of stories, and fond of their life—and their pay is good. Over forty thousand men find employment in and about the ships of the lakes.

In spite of the high serviceability of these waterways, the breezy lake dweller is not yet contented; he is busily devising methods for still further making his backyard seas serve his purposes. Apparently something about the lakes gets hold of the imagination of men and inspires them with daring schemes. There is something peculiarly audacious in the thought of turning these big bodies of water into mill ponds and harnessing them to the wheels of industry; think of the turbines that whir with the waters taken from above Niagara falls, and of Lake Superior at work producing electricity at the "Soo"! But it is in the way of extending the possibilities of navigation in the lakes that the greatest strides have been made and the most wonderful dreams dreamed. Our fathers thanked Providence for a nearly perfect waterway, but our contemporaries are improving on Providence. Witness the splendid system of canals now carrying lake waters. The people of Chicago have recently connected Lake Michigan with a tributary of the Mississippi—a splendid canal thirty-three miles long, costing over $30,000,000. Though now used exclusively for drainage waters, it will sometime bear ships from the lakes bound southward for New Orleans. Then there is the "Soo" canal, containing the largest and costliest lock in the world—or the two "Soo" canals, for the Canadians also have a smaller canal of their own; and the Welland canal, which enables ships to pass around Niagara falls and thus outward along the St. Lawrence river to the sea. Indeed, it was only recently that these daring lake shippers, much to the consternation of the ocean transportation interests, attempted a through line of steamers from Chicago to Liverpool—a project which, though temporarily unsuccessful, will some day be the means of carrying the products of our western fields and mines directly to the doors of Europe, at a cost which will still further increase the profits of our farmers and manufacturers. Then there is the new Erie canal, deepened and made more useful, in which the lake engineers see the nucleus of a magnificent system of deep waterways to connect the lakes with the Atlantic ocean—a canal which will enable the largest ships to pass through central New York, down the Hudson and out to sea, thereby saving expensive transshipments at Buffalo and New York. Another well-advanced plan provides for the connection by a canal, through Canadian territory, of the lower point of Georgian bay with Lake Ontario, thereby saving hundreds of miles to vessels bound to the mouth of the St. Lawrence, eliminating lower Lake Huron, the Detroit river, and all Lake Erie from the voyage, and avoiding Niagara falls and the Welland canal. A glance at a map will show instantly the possibilities of such a canal.

At first sight, one who beholds the activities and perfection of the present system of lake commerce is tempted to declare that this is the full and most significant fruitage of American energy and enterprise, but a very little further observation soon prompts the conviction that the commerce of the lakes, wonderful though it be, is yet only in the infancy of its development. It is, indeed, only as old as the west and the north, and any one who knows of the boundless plains beyond the upper Mississippi, the mines of Minnesota and Wisconsin, the forests, fields, and minerals of Canada, knows that they have only just been touched by human enterprise.

ROMANCE OF THE STEAMBOAT.

BY CHARLES C. FITZMORRIS.

[Charles C. Fitzmorris, journalist; he was born May 1, 1884, at Fort Wayne, Ind.; educated at the public schools; became a member of the staff of the Chicago American in 1902; has been staff correspondent for that paper and is author of many articles for newspapers and magazines.]

Scattered among the cities and towns of the United States, for the most part in those that lie along the great interior water highways such as the Mississippi, Ohio and Missouri rivers, the owners, pilots and captains of the river-craft—the men who gave to the internal commerce of the country its first great impetus—are watching the slow passing of their vocation—steamboating. The romance of the rivers remains only in history. Passenger traffic upon the rivers of the country that reached its zenith fifty years ago has been almost entirely diverted to the railroads. The same, in a lesser degree, is true of the freight traffic. The steamboat has given way to the locomotive. Railroads parallel the rivers for their entire navigable length, connecting towns that depended upon the steamboat.

The larger rivers of the country, the Mississippi, and the Ohio and Missouri rivers, as well as others, still handle enormous quantities of freight. This movement is for the most part down stream. In the month of January, 1905, the freight traffic on the Monongahela river between Pittsburg and Fairmont, West Va., in both directions was 690,776 tons. The corresponding month in 1903, two years previously, shows a freight movement of 912,793 tons. The passenger traffic on the river observed at Lock No. 6, in January, 1905, numbered 91 persons as compared with 482 during January, 1903. On the Ohio river the total freight tonnage, as observed at Davis island dam, Bellevue, Pa., during January, 1905, in both directions, was 202,969 tons as compared with 227,150 tons in January, 1903. The packet movement during January, 1905, numbered 18 as against 26 during January,

1903. On the Ohio and Mississippi rivers the vessel movement via Cairo, Ill., during January, 1905, numbered 148 vessels as compared with 240 during January, 1904. Of the 148 vessels mentioned, 61 were through boats.

There is romance and tragedy, with just a little comedy interwoven in the history of the steamboat commerce, its beginning, development and decadence, upon the rivers of these United States. The steamboat opened the interior of the country, developed and controlled interior commerce and then—saw the railroad come and gain control. History records the claims of many to the honor of having invented and operated a steamboat in this country before Robert Fulton's Clermont successfully navigated the waters of the Hudson river from New York to Albany, August 17, 1807. Of all these claimants, John Fitch, an irritable, excitable genius, stands first. He invented a steamboat that was launched at Philadelphia August 22, 1787 and made a successful trip at an average speed of three and one-half miles an hour. In August, 1788, he rebuilt the boat, named it the Perseverance and made several successful trips between Philadelphia and Burlington. Before the success of his invention was assured he gave way to despair, and the first tragedy in the history of steamboating came when, in the little village of Bardstown, Ky., whither he had retired broken hearted and penniless, he committed suicide, July 1, 1798. Then Robert R. Livingstone, the very antithesis of poor Fitch, wealthy, educated, and calm, with a bent for invention, entered into the situation and experimented for a year until, in 1800, President Jefferson appointed him minister to France. Then came a meeting between Fulton and Livingstone in France, and the two, a few years later, returned to America to build the Clermont, after many attempts made by them previously had met with failure. The story of the Clermont's run from New York to Albany is known to every schoolboy. "The puffing monster," no larger than one of our later day steam launches, "belching forth flames and smoke," breasted current and wind, reached Albany, a hundred and fifty miles from New York, in thirty hours, an average speed of five miles an hour.

There was little romance in these pioneer days of steamboating. They were days of wonder and worry and work—wonder for those who saw the first steamboat working its slow way along, worry and work for the inventor. The romance came later when the steamboat had made possible the towns and cities along the rivers—towns that are flag stations on the railroads now, but in those days before the civil war were flourishing centers with great long wharfs and high storehouses. The wharfs have crumbled away now. The ground they stood upon has been melted away by the water and forms a sandbar at the first curve of the river. The storehouses are gone. The "river town" in its true sense is no more.

The Clermont, guaranteeing a trip in thirty-six hours, including stops and charging $1.00 for every twenty miles and fifty cents a meal, did a flourishing business for eight years, until, in 1814, it was succeeded by the Richmond, a side wheeler like its predecessor. It is worthy of record that the first real "trust" was in the steamboat business. It was formed with Livingstone and Fulton as the officers and was legalized by a grant from the New York legislature, which gave them, the year after the Richmond was put into service, the sole privilege of navigating the waters of that state "by steam or fire." But in those early days the trust failed of popularity, and in 1824 the Supreme court decided that the waters were for all the people, despite the action of the New York legislature.

Then steamboat building began on all sides, throughout the state of New York. As early as 1809, however, Nicholas J. Roosevelt, of Pittsburg, decided that what could be done on the Hudson could be done in the west, and made plans to introduce the steamer on the Mississippi and Ohio rivers. "But the waters are so turbulent," Fulton told him when Roosevelt, riding horseback from Pittsburg to New York, visited the inventor there. "It can be done and will be," Roosevelt replied and went back to his home. That same year this hardy pioneer set forth and made the trip of inspection from Pittsburg to Natchez, studying the situation. At Natchez he turned back. "I knew it," he told a friend at

Natchez, and on the way back he had coal mines opened and fuel piled upon the banks in readiness for the steamer that he firmly decided should venture the unknown terrors of the long stretch of water between his home city and the gulf He brought Fulton and Livingstone from New York, and under their supervision the New Orleans was built at a cost of $3,800 and launched in 1811. It was one hundred and sixteen feet long, twenty feet wide, and drew seven feet of water. As a concession to Fulton the boat was fitted with sails (which were never called into service on the boat).

Then began the first voyage. Roosevelt and his wife—who insisted upon accompanying him, despite the tearful protests of her friends and family—were the only passengers. It was an eventful trip. Stops were made along the river for fuel and to repair the machinery that frequently gave out, and at Louisville the river was found to be so low that the boat could not cross the falls. Returning up stream to Cincinnati, Roosevelt and his wife remained aboard the boat until the water rose, when, once more turning the prow southward, the journey to New Orleans was successfully accomplished. The New Orleans never returned to Pittsburg, but for two years ran between New Orleans and Natchez until at the end of that period she sank.

Thus was the first boat navigated upon the inland waters and the popular superstition that steam was powerless against its parent water dispelled, and thus began the first years of steamboating to be followed by years of increasing prosperity to those fortunate and farseeing ones who took advantage of the introduction of the steamer. There were many who recognized its possibilities. Shipbuilding yards were planned before the New Orleans reached Cincinnati on its first trip, and before the steamer drew up at the wharf, temporarily constructed for it, at Natchez these were well on in the course of construction. Thirty steamboats were built at Pittsburg before 1822. Between the years 1817 and 1827, fifty-two were launched at Cincinnati. Seventeen years after Nicholas Roosevelt and his wife went down the Ohio river there were seventy-three steamboats plying regularly between ports on the rivers in the west—the Mississippi and Ohio for the most part.

One million three hundred and thirty-two thousand dollars annually were poured into the coffers of the owners of boats plying between New Orleans and Louisville, bringing freight from the former city to Louisville. Down stream boats received a revenue of $666,000 during this year from freight alone, while the passenger traffic up and down stream yielded an income of $333,000, altogether, from every source, making an income of $2,331,000 annually from seventy steamboats. There was no competition. Indeed in those days there were not enough steamers to supply the demand of planters and others living along the Ohio and lower Mississippi rivers. The boats, considered swift in those days, occupied five and one-half days in the trip from New Orleans to Natchez, 273 miles, in 1814. Fifty-six years later, in 1870, the time was cut to as low as seventeen hours and eleven minutes by the Robert E. Lee in a great race with the Natchez. But this came later, in the days when romance overshadowed business, when pilots received $100 a day and a boat's speed was reckoned higher than its carrying capacity or earning power. These were the days Mark Twain wrote about—the days of Huckleberry Finn, and Tom Sawyer, the days of Jim Bludso, the days that are gone now but had not yet come then.

During the years that the steamers were traversing the waters of the Mississippi and Ohio rivers the Missouri river had been overlooked, until 1831, when the American fur company sent the steamer Yellowstone up the river loaded with presents to be traded off to the Indians for furs. For five years, or until 1836, when she burned, the Yellowstone continued plying back and forth on the Missouri. It was not until 1856 that steamers were able to navigate the Missouri above Council Bluffs. In 1815, though, the Enterprise reached St. Louis from New Orleans in twenty-five days. In 1826 the first steamer ran up the Alleghany river.

In 1840 the steamboat, no longer an experiment, began to develop. Innovations had come and improvements were made as competition developed. Steamboat lines were formed, boats for passenger service exclusively were built, towns sprang up along the rivers and grew into cities. A new race of men appeared—the river men. Long bearded, quiet eyed and quiet voiced, stalwart men stood in pilot houses dozens of feet above the surface of the water and superintended the work of loading the boats and their navigation. Finished charts and maps of the rivers, with the locations of the sand bars and shoals were made as the demand for greater speed increased, a new type of boats, built for speed as well as strength, appeared on the waters. In a word the river became a much traveled highway and a recognized source of wealth.

Then began the halycon days of steamboating. Pilots were born for those boats—not made. A man must know the river instinctively; he can never learn it, and these pilots who as boys had watched the little stern wheelers puff by them, who had seen large side wheeled boats pass up and down the stream grew up naturally to be pilots—the height of their ambitions. There were 21,000 miles of river accessible to boats of two feet draft and every foot was navigated by men who knew the location of every shoal and guessed correctly—because of their knowledge of the currents—the spot where the ever shifting sand bar lay menacingly along the stream. These were the days of speed and skill—and they were the days of peril also. Rival steamboat lines built boats for speed, luxurious river greyhounds, with great fuel storage capacities and powerful engines, manned by brawny men whose sole duty was to keep the firebox full and the overweighted safety valve screaming, and captained by men who knew no fear and loved a horse race just a little less than they did a boat race. They were days not entirely free from peril, for the racers oftentimes collided when they tried to pass each other in narrow parts of the river, or boilers exploded after the safety valve had been tied down, or over-heated fireboxes set fire to the boats, causing wild scrambles for safety that were not always successful. They were expensive days too, for not infrequently when the fuel gave out during a close race, the captains ordered the freight, cotton or hogs—so much the better if the latter—to be thrown into the fireboxes to "make steam."

There is one race that will go down in the history of our rivers as a "great race;" river men, the old timers, speak of it in that term to-day, and who better than they know what a "great race" between steamboats was? That was the race between the Robert E. Lee and the Natchez from New Orleans to St. Louis, that began June 30, 1870, and ended July 4. The Lee and the Natchez had long been rivals. Captain Leathers of the Natchez had a confidence in his boat that was only equalled by the faith of Captain Cannon in the Lee, and both men were true river captains—ready to prove their faith at any time and under any circumstances. The time came in June, 1870, when both boats were at New Orleans. It had been rumored for days previous that the two boats would race back to St. Louis and the excitement in New Orleans ran high, as indeed it did in all the towns along the river. The passenger list of the Natchez was a large one, but the Lee was running light, intending to go to the marine ways at Jeffersonville, Ind., for repairs. Captain Leathers, because of his passengers and a heavy load of valuable freight, was loath to race and June 25th posted a notice saying that his boat would not race, but he was known in New Orleans and his notice was cheerfully disregarded. Captain Cannon, on the other hand, had made great preparations for the race Fuel had been sent ahead in boats that were to wait for the Lee and run along side of it while the fuel was being transferred. Experienced navigators, men who knew the river and its every twist and turn and all the shoals—no one knew the sand bars—were aboard his boat.

The afternoon of the last day of June was fair, and as the time approached for starting the excitement became keen. Simultaneously the last bit of freight was rushed on board each boat, as with one accord the gang planks were dragged inward, the starting bell rang in each engine room, and the lines were cast off as if by magic. Outward into the stream both boats swung almost together and the race was on. The Lee had a slight lead as they headed up into the stream and their paddles began to churn the waters into white foam. All through the afternoon they rushed ahead, the Natchez, loaded with passengers as she was, falling imperceptibly to the rear as they neared Baton Rouge. At Bayou Sara, Captain Leathers took the wheel and the Natchez began to pick up the distance between her and the Lee and then both boats began to use "forced draft" to make steam and speed.

Not a person slept aboard either boat that first night out. Brilliantly lighted, the monsters, belching forth clouds of smoke and showers of sparks, rushed onward almost within hailing distance of each other, bands playing and the crowds on the decks cheering frantically. Smaller towns slid by unnoticed, but for the throngs that crowded the wharfs. Larger towns loomed into view and faded astern with hardly more attention. At every place, no matter what hour the boats passed, great crowds had gathered to cheer them on and watch the race.

It was 10 o'clock in the morning when the Lee reached Natchez. Fourteen minutes afterwards the Natchez, with a sweep and a swirl drew up at the same wharf. The Lee was delayed four minutes taking on coal and wood; the Natchez lost eleven before the fuel had been transferred, but before the Lee had turned the curve above the city the Natchez was swinging clear of the wharf and heading after her at top speed. It was late in the afternoon when the boats reached Vicksburg. With a pride that nothing could shake, Captain Leathers, of the Natchez, believed his boat the faster under any circumstances and had neglected to provide facilities for obviating unnecessary delays at stopping places. Not so with Captain Cannon of the Lee. He overlooked nothing, and as a result, while the Natchez lost several minutes taking aboard and letting off passengers and freight, the Lee spent only a very few minutes at Vicksburg. As St. Louis drew nearer, or as the boats drew nearer to St. Louis, in sight of each other all the time, the passengers began making bets, and thousands of dollars were wagered. All manner of offers were made to Captain Leathers to lighten his boat and drive it to the limit, but he refused.

At Cairo, the originally appointed ending place for the race, the Natchez was several minutes behind. It had lost an hour on account of an accident to its pumps. The Lee had had a similar accident, but had not been so long delayed. Interest in the race had developed to such an extent that at Cairo both boats were ordered by their respective owners to continue the contest to St. Louis, and so, with as little delay as possible, the last lap of the long race was entered upon. With carte blanche to do anything to win, Captain Cannon early resolved upon heroic measures, and soon after leaving Cairo he ordered the windows to be torn out and thrown into the firebox, with the intention of allowing freer circulation for the air against which the boat was rushing. The wheelhouse had been robbed of its boards for the same reason—that the resistance to the air might be reduced. Captain Leathers was appealed to by a delegation of passengers to adopt the same measures. He refused.

"I am not running in this river to tear up my boat," he said to the head of the committee, "I am here to carry passengers, and I am doing it the best I can."

At the mouth of the Ohio river a score of excursion boats joined the racers, among the former the fastest craft at St. Louis, but they all fell behind after a few miles of the terrific speed set by the long distance racers. And now St. Louis was almost in sight. Caution was thrown to the winds. Pilot and captain of each boat stood at the wheel with eyes strained ahead and nerves ready for anything, while down below a dozen men fed the fires with grease and hung weights upon the safety valve to raise the steam pressure. Thousands lined the levees as the boats drew near St. Louis. Thousands cheered the Lee as she swept around the last curve and burst into sight. Thousands swarmed aboard her, cheering in their wild excitement, when at length, victor by miles, she swung up at the wharf and made fast, the skeleton of the handsome ship that had left New Orleans a few days ago. The Natchez had covered the 1,218 miles in three days, twenty-one hours and fifty-eight minutes on the previous trip. The Lee, victor in the race, had made the distance in three days, eighteen hours and thirty minutes, breaking all known records.

This was the life the river men led in the grand old days "before the war." The steamboat on the rivers of the United States saw its best days in the years from 1840 until 1859 and 1860. In the latter years the growing ill feeling between the north and south resulted in a gradual falling off of trade. Then, in 1861, began the civil war. The first declaration of hostilities marked the beginning of the decadence of steamboating. The sound of the first gun fired on Fort Sumter was the death knell for years of river trading in the sense that the words were used five years before. The impossibility of bringing freight or passengers through a hostile country, the interruption of friendly communication between two sections of the country and the natural slump in all trade made the steamers useless. At this time many of the steamers were pressed into service by the federal and southern armies and became useless after the war or were destroyed. Others were burned by their owners, who did not wish them to fall into other hands than their own. In short, river traffic stopped short and never recuperated.

The war ended, but the period of depression affecting the steamboats seemed only to have begun. Railroads, branching out through the country, had already diverted much freight, the people, even those along the river, had been successful in shipping freight by rail and refused to return to the river route. Railroad lines were built to connect towns hitherto only connected by the river. Railroads ran parallel with the rivers and gained control of the movement of both freight and passengers. Until ten years ago steamboating on the rivers was practically at a standstill, but a slight increase in patronage made itself felt at that time and still continues, gradually decreasing up to the present time. But the river towns of the past are gone. The decay of the river traffic has not been confined to the loss of boats and decrease in their number and tonnage. The towns that were once flourishing centers of business for their part of the country have become of less importance than those farther inland and upon railroad lines. There are dozens of such places. They are found with melancholy frequency. Well within the memory of the present generation Port Louisa, some distance below Muscatine, was a great grain shipping center. Half a dozen warehouses stood beside the river, there were mills and factories. It was the town where the products of rich soil for miles around were brought to be transported on the packets and steamers for New Orleans and Memphis and other ports. Port Louisa has disappeared from the map to-day almost. The warehouses have gone, the mills are gone too. The wharfs where the packets tied up have crumbled away, the tireless river has eaten into the very ground upon which they stood and has carried it down stream to form a shifting sand bar to perplex the river men who still remain.

Such is the history of steam navigation in our country. True, steam navigation upon our rivers is by no means dead, but nevertheless it is dying. The few steamers that ply on the rivers now are for the most part freighters, and tow great strings of barges after them. In this manner one-third of the coal sent out from Pittsburg is transported to its destination, thousands of tons being floated down the current of the rivers annually to New Orleans and points intermediate between New Orleans and Pittsburg along the river. But the days of steamboating are few. Increased facilities for transportation by rail, a gradual increase in the freight rates on the rivers to compete successfully, in a money making sense, with the railroads, is doing for steamboating now what the civil war so nearly finished in the bygone years. The day of the passing of the steamer upon our rivers is at hand. It is being superseded by the railroad, which in turn, as did the steamboat, will yield the supremacy to a new force, mayhap yet undiscovered, but certainly as yet undeveloped.

THE MODERN GRAIN ELEVATOR.

BY DAY ALLEN WILLEY.

[Day Allen Willey, editor and author; born Rochester, N. Y., Aug. 6, 1860; educated at Rochester academy and the University of Rochester; has written hundreds of articles chiefly on scientific and technical subjects for American and English periodicals and is recognized as unusually well-informed on industrial topics, especially commercial geography. The following article was published originally in the Engineering Magazine and is regarded as the best discussion of the subject that has appeared. It is published in this volume by special arrangement.]

Copyright 1902 by John R. Dunlap

The grain trade of the United States has been materially influenced within the last decade through the changes made in the method of transporting and storing the various cereals. The remarkable increase in the acreage devoted to such staples as wheat and corn in the great fields of the west has rendered the old time method of storing on the premises obsolete. Provision must be made for an increase in a single season of, perhaps, three hundred million bushels of corn, alone, to say nothing of fifty or one hundred million bushels of wheat and the same quantity of oats, for it must be remembered that the farmers of the United States to-day are sowing corn fields aggregating over ninety million acres—ten million more than ten years ago—and harvesting two billion bushels and over in a season. Their wheat fields cover forty-five million acres—nine million more than in 1890—and even the oats area is nearly thirty million acres, an increase of 20 per cent.

It may be impossible to sell such a crop immediately except at a loss. If sold by the farmer, the speculator or middle man may decide to hold it for an upward turn of the market, for the grain yield has now reached a point where in ordinary seasons it far exceeds the demand for domestic consumption and must be kept in bulk awaiting the foreign outlook. Therefore the imperative necessity for storage facilities has resulted in the development of the elevator system in America on a scale unknown elsewhere in the world.

On a Dakota, Kansas, or Nebraska farm where the harvest field may cover 500 or 2,000 acres, only a small portion of the yield is threshed and placed in the barn bins. The bulk is carried to what are termed railroad elevators located in convenient towns. These vary in capacity from 10,000 to 100,000 bushels according to their location in the producing district, and from them the transportation company loads its cars for the domestic or foreign market. But the district elevators, as they might be called, represent only a fraction of the space for storage which now exists in the United States. Before it is loaded on shipboard at tidewater, a cargo may pass through four or five different buildings, be transferred from car to vessel and back again to car, as the modern processes employed facilitate its handling.

Elevators are divided into two classes, receiving houses and transfer houses. All of the first-named structures are located on shore, but at cities on the American great lakes and along the Atlantic seaboard can be found floating elevators by which the contents of the lighter or canal boat are discharged into the hold of the ship.

The transfer elevators are usually located at the water side, as they are intended for moving grain from vessel to car and vice versa. If they are marine elevators the plans provide for running the grain cars directly into the structure, track being laid along the ground floor of the building. If the location is such that this plan is impracticable, the track is laid along the side, and from openings in the buildings project the receiving legs or spouts, which are from 15 to 25 feet in length, hinged, so that they can be hoisted against the side of the building when not in use. The end of the spout is carried into the car by the feeder, who moves it from place to place as the contents of the car are emptied. With the spouts in modern use all of the grain with the exception of a few shovels full can be taken out, so that the only manual labor required is that of the feeder. As an ordinary leg will elevate from 9,000 to 10,000 bushels an hour, a trainload of thirty or forty cars representing 1,500 tons can be passed into the building in this time if it have the average number of receiving spouts.

As in the storage elevator, the grain is conveyed to the top compartment, to be held until it flows into the cleaning hoppers, thence to the scales, thence to the distributing or marine legs. The latter are much larger than the receiving spouts, as one is allotted to serve a hatchway. They have an average capacity of from 20,000 to 25,000 bushels an hour, and are of course adjustable, although the cargo must be properly trimmed by the stevedores. So rapidly does one of the elevators transfer its contents, that the first of a carload of wheat may be deposited in the hold of the vessel on the other side of the structure before the last bushel has left the car itself.

The storage elevators are divided into bins of various sizes, with a view of distributing the weight as evenly as possible upon the foundation of the building, and also equalizing the side pressure on the walls. In the wooden structure the bins are square in shape, extending from the top to the ground floor, and are usually massed in the center of the building. As much of the machinery as possible is installed in the cupola, with the exception of the power plant which, in the steam driven elevator, is generally located in a separate building as a precaution against fire and as a matter of convenience. The plan followed in the elevator construction of to-day is usually to locate the distributing department next to the bins, above it the scale rooms, above this the cleaning garners, the shafting and other transmitting machinery being placed at the top. In receiving grain the same method is employed as in the transfer elevator, the contents of the car being carried to the top of the building. In this process and in transmission to the other compartments the systems employed include suction through wood or metal conduits to which are attached exhaust fans, thus creating a partial vacuum, or the use of conveyors. The latter are generally composed of endless belts carrying buckets made of sheet metal which fill and discharge automatically as the belt moves. The belts are used also for carrying away the screenings from the cleaning machinery. The dust and other fine particles are usually removed by an air current produced by a fan and conveyed outside of the building through special spouts. It may be said here that the transfer capacity of the machinery is so adjusted to the different departments in a modern elevator that it is not necessary to stop the machinery at any time to regulate the movement of the grain. The modern method of cleaning the grain is to pass it by belts or gravitation over rapidly moving sieves, which separate the foreign matter which may remain after the treatment. The weighing floor is provided with a series of bins and scales, each of which usually has a capacity of from 10,000 to 15,000 bushels. As fast as a bin is filled, the weight is registered automatically and a door in the bottom is released, allowing the grain to flow into the storage department or into one of the transfer spouts as desired. The house is provided with two sets of scales, so that while one portion of the grain is being cleaned, weighed and stored, another portion may be loaded on shipboard or into the cars without interfering with the other process. During the entire operation the only manual labor needed is adjusting the spouts, and stopping and starting the machinery. Consequently a modern steam elevator, having a capacity for transferring 100,000 bushels of grain in an hour, can be operated by a force consisting of engineer and fireman, the spout tenders, and a half dozen hands to guard against possible accidents in the different departments. The trimming of the vessels is not considered a portion of the elevator work. In elevators where steam is the power directly applied, the main driving belt extends from the engine room to the machinery floor in the upper part of the building, turning a line shaft and pulleys belted to the fans and conveyors. In some of the recently constructed elevators electric motors are employed. These enable operation of one section of the apparatus if desired independently of the others. These motors are belted to the legs, fans, and conveyor pulley.

The tendency in modern storage house construction is to increase capacity. Ten years ago a million-bushel elevator was considered large; but the structures which have recently been erected at railway terminals and at important harbors range from 1,500,000 to 3,000,000 bushels storage capacity and some of them have facilities for loading at one time three steamships, each of 7,000 tons carrying capacity. The great weight to be sustained by such structures and the progress made in the erection of steel buildings has caused steel to be employed with very satisfactory results in some of the elevators recently built on the great lakes. One of these elevators, reputed to be the largest storage house in the world, having a total capacity of 3,100,000 bushels, was erected by the Great Northern railroad company at its terminals at West Superior, Wis., and is used for handling corn, wheat and oats. As it represents the latest ideas in elevator construction, its principal features may be alluded to in this article.

The steel framework rests upon 280 columns of the same material, in turn supported upon concrete pedestals and piling. The outside walls of the lower portion consist of brick resting on stone foundation. The storage compartments are rectangular bins, each 85 feet in height and varying from 6,300 bushels to 24,900 bushels capacity. The bins are made of steel plates 5 feet in length and ranging from five sixteenths to three sixteenths of an inch in thickness. The arrangement of the floors is similar to that in the ordinary elevator, but in operation the cars are hauled into the building in trains of nine each by a cable system. As the grain passes from the cars into the hoppers it is taken by endless belt carriers from the hoppers to the top of the elevator, where it falls into the garners, thence into the scale hoppers, and thence to the scales. From these it drops through a swinging turnhead into spouts, from which it is taken by a belt conveyor and handled longitudinally of the building and delivered into the proper bin. If it is to be cleaned it falls through the bin to one of the cleaning legs, which elevates it. Thence it passes over the sieves of the cleaning machines, returns again to the top of the house, and down into a bin. Before being sent to the shipping bins the grain is weighed a second time. A novel feature of the equipment is a system of automatic shovels, there being one for each car. Each set of nine shovels is so placed on a hanging track that a shovel can be "spouted" to any one of the cars. Each line of shovels is run by two sets of rope drives. Yard room is provided for 160 cars at one time and the empty cars can be quickly discharged by means of a transfer table to the 12 yard tracks which are provided.

In providing power for the various processes, the plan was followed of utilizing individual motors as much as possible in order to obtain greater economy in power distribution. Electricity is depended upon entirely, even the cable system for hauling cars into the building being operated by a 100-horsepower motor. Each conveying belt, cleaner leg, fan, and power shovel is operated by an individual motor ranging from 7½ to 100 horsepower, requiring a total of 2,070 horsepower. The elevator loads 300,000 bushels of grain in twenty-four hours on board vessels and unloads six hundred cars during the same period.

The storage facilities of several other lake ports have recently been increased by the building of elevators, which consist of a series of cylinders of boiler plate, each of which is separated into bins of requisite size. In some cases the cylinders are enclosed in a shell of brick, although several have been built at Buffalo and elsewhere without this casing. As in the structure at West Superior, the bulk of the machinery is located in a cupola above the bins. The grain is placed on shipboard either by the spout method, or by the conveyor system installed in wooden galleries extending from foundation to roof.

By the elaboration of the conveyor belt an elevator can be constructed at a distance of 500 to 1,000 feet from the wharf front yet transfer its contents quickly and without difficulty. The endless belts are connected with the discharging bins and carried to the wharf front in closed galleries. Along the wharf is constructed another conveying system divided into convenient sections, and each provided with marine spouts. Each section of the wharf conveyor is fed by a conveyor belt from the elevator, so that one section can be operated independently of the others or all operated at one time, according to the number of vessels to be served. An example of this method is shown at New Orleans, where a storage and transfer house of 1,500,000 bushels capacity has been constructed by the Illinois Central railroad company. The building, which is of frame design, is located over 500 feet from the river front and is to be provided with four lines of belt conveyors running through double belt galleries and connecting with a series of wharf conveyors aggregating 2,000 feet in length constructed in four sections of 500 feet each. Each section will have a loading capacity of 20,000 bushels an hour. The elevator is being built of wood supported on a concrete foundation, and will receive grain by means of automatic steam shovels unloading the cars which are run into the building on depressed tracks. It will be operated entirely by steam power.

This plan of transferring grain has several advantages, as the elevator can be erected on a site which might be vacant and serve its purpose without interfering with buildings which might be located between it and the harbor. At ports where the shore of the river or bay is so soft as to require an expensive artificial foundation to sustain the weight, the building can be placed inland on a firmer and less costly site. Another advantage of the plan followed at New Orleans is that the damage caused by flooding the banks during high water is likely to be avoided. In rivers like the Mississippi, which are subject to great and rapid increase in depth, special precaution must be taken to guard buildings near the shore from the possibility of such freshets.

SOME ENGINEERING PROBLEMS IN THE PANAMA CANAL.

BY JOHN FINDLEY WALLACE.

[John Findley Wallace, civil engineer; born Sept. 10, 1852, at Fall River, Mass.; he was educated at the public schools of Monmouth, Ill., Monmouth college, and the University of Wooster; in 1869 he entered railway service as a rodman and in 1870 became assistant engineer; the year following he was assistant engineer of the United States engineers, and seven years later, in 1878, county surveyor and city engineer; in 1879 he was chief engineer and superintendent of the Peoria and Farmington railroad; in 1881 chief engineer of the Central Iowa railway, in Illinois; in 1889 he was resident engineer of the Chicago, Madison and Northern railroad, and in 1891 became connected with the Illinois Central system, the first year as engineer of construction, the next six years as chief engineer; in 1898 assistant second vice-president, in 1901 assistant general manager, and in 1902 general manager; appointed chief engineer of Panama canal 1904, resigned 1905.]

The idea of a Panama canal originated about 500 years ago, when a Spaniard by the name of Balboa happened to look over the divide which separated the Caribbean from the Pacific and discovered the Pacific ocean. The first real effort that was made in the direction was in 1826 when President Adams appointed a board of commissioners to consider the problem. In that year a Mr. Palmer obtained a concession, but he failed to carry out the project. I wish to call attention to the fact that it was the Americans, and not the French, who made the first failure at Panama. After this various surveys were made along the isthmus at different times. In 1850 the Clayton-Bulwer treaty recognized in a serious way the probable ultimate completion of the project at some time in the future. In 1848 the Panama railroad company was started. One of the singular features of this charter was that it created an absolute monopoly of every possible means of transportation across the isthmus of Panama. It not only included railroad transportation, canal transportation, highways, but was a monopoly the charter of which was so closely drawn that the natives could not even construct a bridle path across the isthmus. And it was as rigidly enforced—so rigidly enforced that up to a few years ago the Panama railroad company, exercising rights under its charter, refused to permit a person on foot to walk from one side of the isthmus to the other along the right of way on the tracks of that railroad company.

It was due to this monopoly that in the organization of the De Lesseps project the concession for the canal was made subject to the rights of the Panama railroad, and it was due to that position that it was necessary for the French company to purchase the stock of the Panama railroad and obtain control of it, and it was due to that fact that the large majority of the stock of the Panama railroad company, 99 per cent, became the assets of the French canal company, and, among other things, was transferred to the United States government as part of the property covered by the recent transfer when the canal company's property was purchased by the United States.

It is the easiest thing in the world to talk. It is the easiest thing in the world to plan on paper, but you all know that it is the hardest thing to do and actually accomplish things. The work of the Frenchmen, while it has been criticised, we must remember, has paved the way for what we hope will be our success. The results of their work, their study, their drawings, their plans, the physical work which they have actually performed, the machinery which we have acquired that is now on the work, and all the circumstances that surround the control of the French and their work at that project, is one of the foundation stones of what I hope will be our success.

There has been entirely too much disposition upon the part of Americans, through our press and our prominent men, to slightingly refer to what they accomplished. The fact that they did not fully succeed should not take away from that nation and those people the credit for what they actually performed. One of the surprises that I met with on the isthmus, after all that I had heard in regard to the French regime, was to find that they had accomplished as much as they had. I should judge roughly that the information obtained from knowledge of their experiments, and the lessons that we have learned from what might be called their failures, the physical work that they have done, and even the machinery, some large amount of which we will be able to use, will probably enable the United States government to construct that canal at least one-fourth quicker than it would have been able to do if it had not been for what we found there. In all works that are original—that is, in all works which are not simply the reproduction of something which has been done before—there is nothing so valuable to the man or the men who have charge as to know what pitfalls to avoid and to know what not to do. In a campaign or in a siege, for instance, if a division of an army is thrown against an earthwork and partly annihilated, we do not consider that a failure; we do not consider the loss of those men or that repulse an absolute failure, because we know we have developed the strength of the enemy at that particular point; we know we have weakened the enemy to a certain extent, and the sacrifice of those men may be the very thing that will bring ultimate success. There is a great deal of similarity between the two cases, and I would hesitate a long time to say that if we had approached Panama originally, under the same conditions which existed twenty years ago or twenty-four years ago, when they approached it, with no more knowledge than they had at that time, and with the same machinery—I would hesitate to say that we would not have failed in some measure. I have dwelt on this at length largely in a spirit of fairness, and to call attention to the fact that when we do succeed we must realize that it is doubtful whether the Panama canal would ever have been built if it had not been for the efforts made by De Lesseps and his associates.

The plan adopted by the French originally was that of a sea level canal, which was intended to be thirty feet deep below the surface of the water, and seventy-two feet wide. In one way it is fortunate that that canal was not constructed. A little later the French adopted, for economical reasons, what is called the high level plan. There is no engineering reason why they should not have finished the sea level plan. When Ferdinand de Lesseps said that that proposition was a practicable one and a possibility, he simply stated words of sober truth. The only thing that turned the French from that plan was the inability to provide the necessary funds, after an expenditure of a large amount of money, to carry out the project. It was simply a case of being short of funds and short of time, and desiring to produce some tangible results with the funds which yet remained available in their treasury. There were no obstacles that were insurmountable, and there were no reasons discovered by the French that rendered the ideas of M. De Lesseps untenable or his projects impracticable. As I said before, however, it is fortunate that the canal was not finished along those lines, as less than 50 per cent of the commerce of the seas to-day would be able to pass through a canal of that character. After the first canal company went into liquidation a new company was formed, and they prosecuted the work in a small way, their object, of course, being to maintain their franchise and be in a position to dispose of their property either to a larger company formed in France or to sell the project to others.

In 1889 a commission was appointed, under authority of an act of congress, to investigate and report on the different routes under consideration across the isthmus. The province of this commission was not to determine the best plan at Panama or the best plan at Nicaragua, but it was to determine which of the three or four general routes which had been discussed and considered was the most practicable and the most feasible. As is well known, that commission made a recommendation in favor of Nicaragua, with the reservation, however, that if the franchise and property of the Panama company could be purchased for $40,000,000 or $50,000,000, that route would be preferable. There is no question, and I presume it will not embarrass any one to say at this time, that that commission would probably not have made their report in that way if they had not been members of a nation every one of whom at some time in his life was in the habit of trading horses or making other trades which rendered it necessary to tell a little different story than the one he really believed in. If that commission had come out frankly and said that the Panama canal was the best and all that sort of thing, the United States government probably could not have purchased the property for the price it did.

The trade was certainly an exceedingly good one. It embraced not only the franchise; it embraced thousands of acres of land; it embraced the work which had already been done, a part of which will be utilized. It also embraced machinery and supplies for which $29,000,000 has been paid in cash, and although a great deal of the machinery is antiquated, some of it can still be used. The storehouses were filled with supplies. Some have deteriorated. I found one machine shop in a jungle that was fitted with machinery, That machine shop is now in operation. I found about 3,500 ten yard dump cars of steel, 2,500 of which will be put into service. We have from two to three hundred locomotives that are a great deal better than the average locomotive that an ordinary railroad contractor uses.

We have steel rail enough for about 150 to 200 miles of construction track. We have excavators which, although not as efficient as an American steam shovel, can be used. The equipment—that is, the floating equipment that was in salt water—the rails were very badly damaged. The larger machinery, however, which was housed and was not actually out on the work when the work stopped, was in very good condition, though the rust had affected it a little. I found boilers and derricks and various machines scattered over the isthmus that a day's work would put in condition to put steam in, and it was surprising how little the corrosion had injured the metal. After the first coating of rust—that is, on those parts that were not required to be smooth or polished—the climate seemed to have very little effect. Parts of machinery that were made up of wood were, of course, decayed and the wood destroyed. But it was very gratifying to note the excellent condition of a great deal of the machinery.

The function of the last commission was to compare routes. As a result of their effort, and as a result of the diplomatic effort of our worthy president and his advisers, we are now in possession of a strip of land ten miles wide and forty-seven miles long, comprising what is known at the canal zone; in possession of the franchise; in possession of 99 per cent of the stock of the Panama railroad, including the Panama steamship line from Panama to Colon, the railroad property in itself being worth from four to five million dollars; in possession of the results of the investigation of the Frenchmen and their engineers, covering a period of twenty-four years; we are in possession of their organization; we are also in possession of the general facts which were turned over to us by the former commission.

The work which is now before the present commission is, first, the determination of the most practicable plan to build the canal, varying from a sea level canal to a high level, some ninety feet above the sea level.

The problem before the commission to-day is: First, deciding on plan. Of course it is needless for me to say at this time anything in regard to the advantages of a sea level canal beyond this fact, that in comparing the value of the various projects, instead of making the comparison on the basis of gross cost, the process will be to take the interest on cost, say at 4 per cent, add to that the cost of maintenance and operation, add to that the element of value represented by the time of the passage of vessels through the canal, estimating a certain amount of tonnage and a certain amount of traffic, and the minimum figures resulting from a combination of these figures will indicate the project which will be the most economical from a financial standpoint alone. Of course that does not consider the advantages of a sea level canal which can be enlarged, widened, deepened, without the disturbance of traffic. It does not consider a great many other advantages which are self evident to the sea level plan. The only possible objection that can be raised to the sea level plan is the increased time it will take to construct it and the increased cost. While no exact estimates can be made until all the borings are completed in order to determine the exact character of the stratification of the isthmus, it is safe to say that as far as time is concerned a sea level canal can be completed in about 50 per cent longer time, and will not cost to exceed $50,000,000 in excess of the cost of a high level canal, and possibly these figures both as to time and money will be found later to be too large.

That would give the time from twelve to fifteen years and the cost about $250,000,000. The reason that such a small increase in cost is necessary is due to the fact that in the original estimate of the former commission $36,000,000 was estimated as the cost of various locks and dams, the larger part of which will be unnecessary should a sea level canal be adopted. One of the principal objections that heretofore have always existed to the sea level canal has been the control of the Chagres river. The data for the proper solution of this problem have never been at hand until now. Investigations have developed, first, the fact that a foundation for a dam at a point where the canal leaves the valley of the Chagres can be secured at no greater depth than sea level for a masonry dam, and that it is possible to get a spillway through a tunnel only seven miles in length, which would turn the water impounded by this dam into the Pacific slope about ten miles below Panama, turning the flood waters of the river through the mountain, leaving for us to contend with only such water as might fall in the Chagres basin between Gamboa and the mouth of the river, a distance of about twenty-five miles, which could easily be done by small channels—diversional channels in each side of the main axis of the canal.

An alternate plan was the diversion of the upper waters of the Chagres, that is, the overflow from the Gamboa dam, through a three and one-half mile tunnel into a stream on the Caribbean side, which would discharge the water into the main channel of the Chagres about ten miles above Colon, but at a point where the valley was several miles wide and where the canal could be connected by the waters of a canal into a bay in the rear of Colon that would not interfere with the canal. This problem of the Chagres river has been the bugbear of all the engineers and scientific men who have given the Panama canal problem any consideration. While the estimates are not completed showing the cost of this dam and this spillway, there is no question but what these works can be completed for less than $16,000,000, which would leave $20,000,000 of the amount provided by the former commission for locks and dams available for the extra excavation needed for a sea level canal.

Next to the sea level canal plan will be one with a thirty-foot elevation above sea level; next sixty feet, and lastly ninety feet. The ninety-foot level plan was dependent entirely upon the construction of a dam across a narrow place in the Chagres river at Bohio. It will be necessary to put the foundation of this dam to bedrock, and to carry it ninety to one hundred feet above the sea level. The rock borings which have been made at that point, however, develop a narrow gorge in the original foundation, which the former borings of the former commission and the French engineers did not develop on account of their great distance apart, so that we found we cannot obtain solid rock at a nearer elevation than 150 feet below sea level, which would be the depth we would have to go with a curtain wall foundation in order to prevent a dam constructed at that point being undermined or water wasted. This additional depth of bedrock, while it did not render the construction of a dam at Bohio an impossibility, very largely increases its cost and very largely increases the difficulty and the time it would take to construct it. So that the strong possibilities are that the plan ultimately to be decided upon will be either a canal with six locks at an elevation of ninety feet, or of four locks at sixty feet, or of thirty feet with two locks, or a sea level with a single lock at the Pacific end.

In this connection I desire to say that even a sea level canal necessitates one lock, on account of the fluctuation of the tides at the Panama end of the canal. The level of the Caribbean and the level of the Pacific, while they are exactly the same at mean low of the tide, vary about ten feet at different stages of the tide. The Pacific tide at the ebb is ten feet lower than the Caribbean, and at the flood is ten feet higher, there being a fluctuation of twenty feet on the Pacific, with practically only a few inches at Colon.

Of course, the construction of the canal itself, while a work of magnitude, necessitates a great many other pieces of work. First is the construction of a harbor at Colon, which is estimated to cost $5,000,000 or $6,000,000. Second, the control of the Chagres river, which is very important. Third, the improvement of the Panama harbor. Fourth, the utilization of the water power and the water supply developed at the Gamboa dam or at the Bohio dam or whatever dam is constructed in order to furnish the necessary lighting power to light the canal and eventually operate the railroad along its banks, and to furnish the water supply for the various cities and towns.

One of the first problems, however, we have to meet is the water supply of Panama and Colon. We are at present engaged in the construction of a water supply to Panama which will cost about $300,000 or $400,000; a sewerage system which will cost as much more, and the repaving of the streets, which will require an expenditure in Panama, in order to make it perfectly sanitary, of practically $1,000,000, and about half this amount of money will have to be spent at Colon in order to improve that city and to make it habitable for the population which will construct the canal, and its subsequent maintenance and operation will necessitate.

A great deal has been said in the public press about the labor problem. It is not expected that we shall have at any one time to exceed 10,000 or 12,000 workmen on the isthmus, and possibly over half of that force will be of the character called skilled labor—that is, men capable of operating steam shovels and excavators and locomotive engines and steam pumps and steam derricks, and machinists and boilermakers and the various classes of mechanics that go with work of that character. The common labor problem I do not look upon as a serious one. So far, all of the labor that we have found necessary to employ has drifted into the isthmus from the surrounding country and from the island of Jamaica. It is a class of labor which, while not as efficient as we would find in the United States, is adapted to that climate and to that country. That we will find it necessary to bring labor from China, from Japan, from Italy, or even negroes from the southern states of this country I do not believe.

In regard to the sanitary conditions on the isthmus, I presume that there is no tropical country but would have developed the same bad reputation under the same treatment, under the same conditions. I doubt very much, if the same number of men who were engaged on the construction of the Panama canal at the time when the work was at its height had been employed similarly in the lowlands of the United

States, whether we would not have had almost as high a rate of mortality. There is nothing about the isthmus itself that is any more unhealthy than any other tropical country. In fact, from what I have seen of it and have been able to learn from study, I should judge that it is much more healthy than the majority of tropical countries. I have never seen the temperature in the shade over 86. I have never passed an uncomfortable night.

One of the favorite stories you have heard time and again of Panama was that during the construction of the Panama railroad there were as many men buried along the line of that road as there were ties in the railroad track. There never has been employed on the Isthmus of Panama, in the construction of the railroad or in the construction of the canal, including the inhabitants of the towns along the line, as many people in the fifty years that the railroad has been in existence as there are ties in the track of the Panama railroad.

When it was necessary to make a treaty for the construction of the canal with the government of Panama it was found necessary that the United States should have control of a strip of land which we now call the canal zone, which, as I said before, is ten miles wide and approximately forty-seven miles in length. At each end of this strip, however, were the cities of Colon and Panama, Panama being the capital of the province and the center of its trade. The republic of Panama could hardly give away itself, although it was willing to give anything it had to secure the construction of the canal; so the result was that the cities of Panama and Colon were exempt from the control of the United States government as part of the canal zone. In other words, those cities remain as governmental islands in the strip, and are part of the republic of Panama. The only reservation the United States government made in the treaty in regard to these two cities was the right of supervision, first as to law and order, provided the cities of Panama and Colon could not govern themselves; and second, the right to supervise the sanitation. It was this provision of the treaty which enabled us to go into the cities of Panama and provide a water supply and sewerage system, pave streets, and create a fund that it is the intention of the cities of Panama and Colon to eventually pay back to the United States government. When so paid for these municipal improvements will become part of these cities.

The canal zone necessitated a government. The isthmian canal commission are practically a legislative body under congress and the president, which governs the zone. They have appointed one of their members, Charles E. Magoon, governor of the zone, and we have a miniature government there, consisting of a governor, a chief of police, a postmaster general, a customs revenue officer, quarantine officer; and the sanitation of the isthmus on account of the enforcement of sanitary regulations is also under the government of the zone. The construction of the canal, however, is under the chief engineer. The governor of the zone reports to the commission on all affairs connected with the government of the zone, and the chief engineer reports to the commission through its chairman, E. P. Shonts, all matters connected with the construction of the canal.

THE ISTHMIAN CANAL IN ITS ECONOMIC ASPECTS.

BY EMORY R JOHNSON.

[Emory Richard Johnson, professor of transportation and commerce in the University of Pennsylvania; he was born March 22, 1864, at Waupun, Wis.; he was educated at the public schools, at the State normal school of Oshkosh, Wis., and in 1888 was graduated from the University of Wisconsin, continuing his studies in the University of Pennsylvania; in 1893 he was instructor of economics at Haverford college, resigning in 1896 to become professor of transportation and commerce in the University of Pennsylvania; in 1899 he was expert on transportation on the United States industrial commission, and in June of same year became a member of the United States isthmian canal commission; since 1901 he has been editor of the Annals of the American Academy of Political and Social Science; he is the author of Inland Waterways, American Railway Transportation, and papers on railways and economics which have been published in reviews.]

Copyright 1902 by American Academy of Political and Social Science

The construction of a canal across the American isthmus was proposed mainly for two reasons—that it will strengthen the efficiency of the American navy, and that it will facilitate commercial intercourse both between the eastern and western seaboards of the United States and between each of those sections and those foreign countries adjacent to the Atlantic or Pacific with which, under present conditions, commerce is seriously restricted because of the great length of existing water routes. The canal will affect American industries by facilitating our foreign and domestic trade.

When we consider that our total foreign trade is second only to that of the United kingdom and that our exports already outvalue those of that great commercial nation, that our exports of manufactures have doubled in five years and will soon amount to half a billion dollars annually, we can appreciate the growing magnitude of our foreign trade; and when we further consider that the industries which create this great surplus for foreign trade represent the activities of but 80,000,000 people, and that our population will reach 100,000,000 by the time an Isthmian canal can be opened for commerce, the reason becomes manifest why the American people have a widespread and well nigh unanimous interest in the early execution of that great work.

The costs of manufacturing iron and steel products and many other commodities are already lower in many parts of the United States than they are in Europe, and further economies in production are certain to be introduced during the coming ten or fifteen years. Having this present and prospective superiority over our greatest competitors, in the expenses of production, the future growth of our foreign trade becomes primarily and essentially a question of securing cheaper transportation. When the American manufacturer has the advantage over his competitor, both in the costs of production and in the expenses of transportation, he will surely control such foreign markets as he may require for the disposition of his products.

The two seaboards of the United States average over 13,000 nautical miles apart by the shortest ocean route—the one followed by steamers through the Straits of Magellan. Steamers take sixty days to make the voyage between New York or Philadelphia and the Pacific coast of our country, and sailing vessels require fully twice that time. The isthmian canal will shorten the ocean distances between our eastern and western states between 8,000 and 9,000 nautical miles, to less than 40 per cent of the length of the present routes, and will bring the countries of the eastern half of the Pacific ocean nearer to the eastern part of the United States than to Europe.

The following detailed table shows the distances for full powered steamers between the principal Atlantic and Pacific ports via the Panama canal route. The distances are those by arcs of great circles and by the actual routes which vessels will naturally take. It was believed that the length of commercial routes really taken by ships would be more instructive than the length of the shortest sailing lines between Atlantic and Pacific termini. The calculations were made for the commission by the United States hydrographic office.

Europe is now nearer by water routes to all parts of the Pacific than are the people of the United States, whose commercial connections are with Atlantic and gulf ports. Even the east coast of South America, south of the equator, is nearer to western Europe than to the manufacturing

DISTANCE FROM AMERICAN AND EUROPEAN ATLANTIC PORTS TO PACIFIC PORTS VIA THE PANAMA CANAL.

FROM	To Port Townsend via San Francisco.	To San Francisco.	To Guayaquil.	To Callao.	To Iquique.	To Valparaiso.	To Coronel.	To Yokohama via San Francisco.	To Shanghai via San Francisco and Yokohama.	To Manila via San Francisco and Yokohama.	To Sydney via Tahiti.	To Melbourne via Tahiti and Sydney.	To Wellington via Tahiti.
New York	6,074	5,299	2,864	3,359	4,021	4,630	4,838	9,835	10,885	11,585	9,852	10,427	8,892
Norfolk	5,872	5,097	2,662	3,157	3,819	4,428	4,636	9,634	10,684	11,384	9,650	9,858	8 690
Charleston	5,673	4,898	2,463	2,958	3,638	4,229	4,437	9,344	10,367	10,809	9,451	10,006	8,491
Fort Tampa	5,328	4,553	2,098	2,593	3,255	3,864	4,072	9,069	10,119	10,819	9,086	9,661	8,126
New Orleans	5,477	4,698	2,263	2,758	3,420	4,029	4,237	9,234	10,284	10,984	9,251	9,826	8,291
Galveston	5,574	4,799	2,364	2,858	3,520	4,129	4,338	9,335	10,385	11,085	9,352	9,927	8,392
Liverpool	8,813	8,038	5,603	6,098	6,760	7,369	7,577	12.574	13,624	14,324	12,591	13,166	11,631
Hamburg	9,242	8,467	6,032	6,527	7,189	7,798	8,006	13,003	14,053	14.753	13,020	13,595	12,060
Antwerp	8,963	8,188	5,753	6,248	6,910	7,519	7,727	12,724	13,774	14,474	12,741	13,316	11,781
Bordeaux	8,713	7,938	5,503	5,998	6,660	7,269	7,477	12,474	13,524	14,224	12,491	13,066	11,471
Gibraltar	8,447	7,672	5,237	5,723	6,394	7,003	7,211	12,208	13,258	13,958	12,225	11,168	11,265

sections of the United States. The Suez canal has brought Europe nearer than the United States is to the East Indies, China, Japan, and Oriental countries generally, and until an American canal route is opened, the manufacturers and most of the exporters of this country will find their lower costs of production largely, if not quite, offset by the greater expenses of transporting their commodities to many of their most promising markets.

A large trade with western South America, Oceania, and Asia has come to be not only advantageous but almost essential to the industries of the United States. The nitrate of soda from Chile, the cacao and the forest products from tropical America, the sugar from Hawaii, the hemp from Manila, the wool, hides, and gums from Australia and New Zealand, the raw silk from Japan and China are examples of the raw materials of which large and rapidly growing quantities are required by American manufacturers. Furthermore, the countries supplying these raw materials now furnish a valuable market for machinery and manufactures, and with the development of their natural resources, and the modernization of their industrial processes and social life, their purchases will largely and continuously increase.

Although, until an isthmian canal has become available, the United States must compete for most of the Pacific trade under great disadvantages, our present commerce with the Pacific makes no mean showing either as to volume or rate of growth. During the decade, 1890 to 1900, the value of exports to Japan, China, and Asiatic Russia increased from less than $20,000,000 to nearly $70,000,000, and our exports to Australia, Hawaii, and the Philippines from $16,000,000 to $43,000,000; the total exports to those countries having risen from $36,157,089 to $108,304,911, a gain of 200 per cent in ten years.

Our trade with the west coast of South America is not large, but ought to be and will become so as soon as the people of that section are able to secure our cotton goods, mining and agricultural machinery, and general manufactures directly and cheaply. Nearly one-third of the tonnage that would make use of an isthmian canal, if it were opened to-morrow, would be contributed by the trade of the western part of South America. This large commerce is now nearly all in the hands of Great Britain and Germany, but such will not long continue to be the case when ocean vessels can pass the American isthmus. Western South America is one of the few sections of the world that will always send us more tons of cargo than we shall ship to it. We require its raw materials in large quantities; it needs our manufactures. The trade will be reciprocal and highly valuable for both parties to the exchange.

Statistics of commerce are often less instructive than the experiences of men engaged in foreign trade. A New York firm, whose manufacturing plants are in New Jersey, stated in a letter to the canal commission: "Our business in the Sandwich islands has been very large in the past few years,—at the rate of over one-half million dollars per year. This could undoubtedly be increased, and at the same time the sugar, and other industries, there, fostered, if we were not handicapped by the long railroad haul across the country." Thus one American firm, of whom comparatively few Americans have ever heard, is now shipping annually to little Hawaii over half a million dollars worth of goods.

The commission received a letter from a Maryland firm stating that the firm at the time of the writing of the letter was filling a foreign order for 70,000 tons of rails for the Trans-Siberian railway, and also an order for 30,000 tons of rails to be sent to the government of Victoria, Australia.

One Philadelphia firm shipped two full vessel cargoes of locomotives to China and Siberia in 1898. In 1899 another full cargo of engines was shipped to the same countries, and in 1900 a fourth full cargo was sent—156 locomotives sent by one Philadelphia firm to China and Siberia in a little more than two calendar years! Facts like these show the relation of the Pacific trade to the future industrial progress of the United States.

A brief reference to the manner in which the canal will affect the industries and commerce of different parts of the United States,—the Pacific slope, the southern states, the eastern section and the central west, will reveal some of the more important relations of the waterway to the economic interests of our country.

The typical products of the Pacific slope are wheat, barley, beet sugar and hops, lumber and shingles, fruit and vegetables of many kinds, cattle, hides, and wool, and the articles obtained from the extensive river and marine fisheries,—that is to say, the west coast produces foods and the materials of industry. Some wheat flour, lumber, and canned foods are sold in Oceania and trans-Pacific countries, but the largest market for all the west coast produces is in Europe and the manufacturing sections of the eastern half of the United States. With the exception of the great Cordilleran plateau, or Rocky mountain section of our country, the Pacific coast region is the most geographically isolated portion of the United States, and will remain so until it has secured cheap water transportation to its natural markets. In spite of the great economies that have been effected during the past twenty years in the costs of moving freight by rail, the volume of bulky freight that can be profitably hauled over high mountains to markets 2,000 to 3,000 miles distant is small. The evidence obtained by the canal commission on this point is extensive, and was obtained directly from shippers and railway officials.

The west coast producers are already feeling the competition of Argentine and other rival sections and are extremely desirous of securing cheaper and speedier access to the north Atlantic. The people of the Pacific states, moreover, are buyers as well as sellers, and they and the eastern manufacturers from whom they buy find the existing freight costs a heavy burden and a serious business handicap.

Throughout American history the exports from the southern states, the cotton, tobacco, lumber, and naval stores, have constituted a large part of the tonnage of our foreign commerce; and latterly phosphate, coal, iron and steel, and general manufactures have made an important addition to the outbound trade of that section. Most of these commodities are bulky and require the use of a large tonnage of shipping for their transportation. The products of the south find their present foreign market mainly in Europe, but they are desired in greater of less degree by nearly all countries, those of the Pacific ocean, as well as those of the Atlantic. Because of the geographical position of the south, its exports are largely excluded from the markets of the Pacific. The position of the south as regards Pacific trade is very similar to that of the west coast of the United States as regards its commerce with Atlantic countries.

The canal will benefit the cotton industries of the south by giving the American staple a larger and more profitable trade in the Japanese market, where there is a keen competition with East Indian cotton, and it will also greatly facilitate the exportation of cotton goods to western South America, Asia, and Oceania, where Great Britain and Germany now do a large business. The southern mills are making great progress in cotton manufacturing, over 5,000,000 spindles are now running in those mills, and it is predicted by the commercial organizations of Charleston that North and South Carolina, whose annual crop of raw cotton is about one and one-half million bales, "will within a period of five years spin more cotton than they grow." The cloth made in the south is admirably adapted to the Pacific trade, and the southern mill owners are desirous of a short route to Pacific markets.

The iron industries of the south will send through the canal to South America, Hawaii, California, and trans-Pacific countries large quantities of such articles as iron pipe, engines, mining, and agricultural machinery and steel wire. One of the large iron and steel manufacturing firms of the United States, whose business, according to its reports, amounts to from $35,000,000 to $40,000,000 annually, says that "It is looking forward to a large export business in the near future with the different colonies of the United States and with South America, Asia, Africa, and Europe." This firm believes that the Birmingham, Alabama, district "is destined to become the principal manufacturing center in the United States for the export trade in iron and steel." . . . . "The opening of the isthmian canal would be of incalculable benefit to us in increasing our facilities for export business, and would warrant the development of our southern property to the fullest extent. We are positive that the markets of the world can be reached and supplied with our finished product (especially from the southern district)."

The manufacture of machinery, tools, implements, and the great variety of articles made from iron and steel is carried on mainly in the states north of the Ohio and Potomac, and the total effect of the canal upon the iron and steel industries will be even greater in the north than in the south. Everybody realizes that the opening up of the undeveloped countries of the Pacific ocean will require vast amounts of iron and steel manufactures, and when a canal has been constructed the people of the United States will secure a very large share of the trade. What is now being accomplished in spite of the present high cost of transportation is but an earnest of the future.

Besides aiding the cotton and iron and steel industries of the southern states, the canal will open up a large market for their coal, lumber, naval stores and phosphate rock. The coal will be required by the vessels using the canal, and in the coaling stations of the eastern part of the Pacific ocean in tropical and south temperate latitudes, and also for industrial purposes along the west coast of Central and South America. This exported coal will be mined not only in Alabama, but also in the northern bituminous fields of Pennsylvania and West Virginia, which enjoys especially cheap transportation to New Orleans by the Ohio and Mississippi rivers. The southern states now send large quantities of lumber to the eastern coast of South America, and as soon as a canal has been opened they will ship to the west side of that continent and to other Pacific sections. The hardwood and yellow pine lumber of the south will be required in the development of the resources of the South American and other Pacific countries, and the phosphate fertilizers of Florida, South Carolina, and Tennessee will be exported to Japan and to countries where agriculture is carried on by the intensive culture that goes with irrigation.

The reference previously made to the Pacific business of a New York, a Philadelphia and a Maryland firm partially illustrates the manner in which the canal will affect the industries of the eastern part of the United States. This part of the United States is interested in the proposed waterway chiefly because it wants to get its surplus manufactures to Pacific markets and exchange them for foods and raw materials. Since the opening of the Suez canal, Europe has had such an advantage over our eastern states in reaching Pacific markets that American manufacturers located in or having rail connections with our Atlantic seaports, find difficulty in competing with their transatlantic rivals for the trade of Australia, Oceania, and the Orient. The Philadelphia board of trade and maritime exchange state in a joint report which they prepared for the Isthmian canal commission, that the canal will assist "our Philadelphia merchants to enter into more effective competition with the nations of Europe which are now enabled to underbid us in the far east, by reason of the more economical and expeditious transportation which their merchants enjoy by the Suez canal route." What is true of Philadelphia is true of the other manufacturing or commercial centers in the eastern states.

Information, in considerable detail, regarding the present trade of the central west with Pacific markets was secured for the commission by commercial organizations in Cleveland, Cincinnati, Indianapolis, Chicago and St. Louis. In each of these cities the leading association of business men addressed to its members a letter of inquiry regarding the nature and the volume of the commodities imported and exported, the routes now employed, and the manner in which an isthmian canal would affect the routes of shipment and the development of trade. The replies received showed the existence of a large exportation of manufactures from the central part of the United States to Pacific countries. American manufacturing activities are rapidly spreading throughout the central states, and the business men of that section are hardly less interested in securing ready connection with the Pacific than are the men whose plants are located nearer tide water.

In the city of Chicago a great variety of manufacturing industries is carried on, and shipments are made to all the countries of the Pacific. Railway materials and mining and agricultural machinery, however, are especially important, mining machinery being sent to all parts of the world, wherever mining operations are carried on. The foreign trade of one Chicago firm engaged in the manufacture of mining machinery amounts to 15,000 tons annually. The agricultural machinery manufactured in and about Chicago is now shipped to the west coast of South America, to eastern Siberia, and to various parts of Australasia. The Australasian trade of one firm in 1900 amounted to 11,000 tons. The shipments of this firm and presumably of others of that part of the country are made by way of New York, except on rare occasions, when, for the purpose of economizing time, the goods are routed by way of San Francisco or Vancouver. The rates from New York are usually much lower than those by way of the Pacific coast. The time taken to get goods from Chicago to Australia varies from sixty-five to eighty-five days, ten days of that time being required for getting the goods to New York city. The average time from Chicago to the Pacific coast is eighteen days, and steamers from our Pacific coast to Australasia take from twenty-two to twenty-eight days for the passage. The canal will shorten the distance by water from our Atlantic seaboard to Australasia by approximately 4,000 miles, and the distance to South America more than twice that number of miles.

The effect of the canal upon the business of building ships is worthy of special consideration. The canal is to be a highway for ocean commerce, and the results of the construction of the waterway will be felt first of all in the shipyards and merchant marine of this country. Information was received by the canal commission from forty American firms engaged in the building and operating of ships concerning the effect which the canal will have upon their business. The canal will unquestionably enlarge the coasting trade between the two seaboards of the United States and will cause a larger number of steamers to be built in American yards. Some of the vessels now employed in our coasting commerce will use the new waterway, but most of the ships for the trade between our two seaboards will consist of large freight steamers of modern design specially constructed for the trade. The evidence secured regarding the cost of building vessels seems to indicate that the enhanced demand for coasting vessels, together with the declining costs of material and the economies constantly being made in the labor expenses of construction, will during the next five or ten years enable Americans to build ships as cheaply as they can be launched on the Clyde.

The ownership and operation of ocean vessels by the large industrial firms as a part of their business, which has now in many cases come to include the entire process of obtaining the raw materials, converting them into usable commodities and placing them in the hands of the consumer, whether foreign or domestic, will, to some extent, solve the question of our securing a larger merchant marine owned by Americans. Whether these vessels owned by American producers will be sailed under our flag, or under that of some foreign nation, will be determined by forces over which the isthmian canal will have but slight influence.

Some of the vesesls employed in the commerce between our eastern seaboard and trans-Pacific countries will doubtless desire to participate in the interoceanic coasting trade of the United States, and in order to do so they will need to have the American registry. The action of congress in restricting the commerce of Porto Rico and Hawaii with the United States to American ships suggests that our trade with the Philippines may also be limited to the vessels flying our flag. When congress takes such action regarding the Philippines, a considerable share of the commerce of our Atlantic and Gulf ports with Japan and China will be carried in American vessels, because such ships would be able to participate in both our Philippine and foreign trade.

Any benefit conferred upon our shipbuilding industry will indirectly aid in the enlargement of the tonnage of American vessels engaged in the foreign trade of the United States. If the American purchaser could secure vessels at home as cheaply as in foreign yards one of the present reasons for registering his ships under the flag of some other nation would be removed. The future growth of the merchant marine under the flag of the United States will depend on numerous factors, some economic and some political. The construction of the isthmian canal will apparently affect that growth favorably.

The effect of the canal on the traffic of American railways is a question concerning which much has been said in all discussions of the isthmian waterway, and an endeavor was made by the writer to secure from shippers in different parts of the country and from the traffic officials of the railways as much information as possible on this important subject. As to the business of the railway systems in the territory between Chicago and New York and of those in the southern states, the evidence is practically unamimous that the canal will be beneficial. As regards the effect of the new water route upon the railroads west of the Mississippi river the testimony is divided. That the canal will be a rate-controlling factor of wide reaching importance is generally admitted, and naturally enough is feared by those railway officials who do not think the waterway will bring much new and compensating business to the railroads. Here is the crux of this question, will the canal make business for the trans-continental railroads? Some of the trans-continental officials say yes and some say no; but the experience of history has always been that the improvements in facilities for water transportation have resulted in the diversification and distribution of industry and added to the volume of business done. Some of the railway officials with whom I have conferred believe that this experience will be repeated by the opening of the isthmian waterway. A well known president of one of the western roads expressed this thought clearly and concisely in his reply to the commission's inquiry: "In a general way, my idea has been, and is, that the construction of the canal would be beneficial to the Mississippi valley as well as to the Pacific coast. I incline to think cheaper transportation for heavy freights between the Mississippi valley and the coast would so increase general business that the railroads would get back, out of high-class freights and passengers, more than they would lose by the loss of low-class traffic where time is not important."

Having outlined the relation of the canal to our industries and our shipping and transportation interests, there remain the questions of traffic and tolls to be considered.

A detailed study of the foreign commerce of the United States for the year ending June 30, 1899, and of the commerce of Europe with the western part of the American continents during the calendar year 1899, has been made to ascertain the tons of cargo or freight and the net register tonnage of the vessels that might have passed through an isthmian canal had one been in existence. The cargo tonnage was found to amount to 6,703,608. This total does not include the comparatively small amount of freight that passed by water between our two seaboards, the statistics of which are not obtainable. It comprises 1,807,365 tons for the commerce between the eastern seaboard of the United States and Australasia, Oceania, Japan, China and Siberia; 1,629,387 tons for the trade between the west coast of the United States and Europe; and 3,266,856 for the commerce between Europe and western South and Central America, western Mexico, Hawaii and British Columbia. It does not include any of Europe's trade with other parts of the Pacific.

The tonnage of the vessels that might have used an isthmian canal in 1899 was ascertained by an examination of the statistics of entrances and clearances kept by the United States and European countries. The vessel movements connected with the commerce of the eastern seaboard of the United States with Pacific America and with Australia, Oceania, the Philippines, Japan, China and Siberia, and the vessel movements between the western coasts of the American continents and the north Atlantic American and European ports were found to amount to 4,074,852 vessel tons net register, including 336,998 tons, for the commerce now crossing the isthmus of Panama.

This total was compared with the result of a traffic investigation made by the new Panama canal company. The records of vessel movements kept by that company show a traffic for the calendar year 1899 of 3,848,577 tons net register for the commerce between Europe and the western coast of the American continent, between the Atlantic seaboard of America and trans-Pacific countries, and between the two American seaboards. The total obtained from the records kept by the Panama company does not include any vessel tonnage for the commerce now crossing the isthmus. The addition of that tonnage, 336,998 tons, raises the total to 4,185,575.

In addition to this tonnage, which comprises only traffic originating or terminating in America, there should be included most of the commerce of Europe with New Zealand and the other islands of the Pacific east of Australia. New Zealand will be 1,503 miles nearer Liverpool by the Nicaragua canal than via the Suez route, and 2,407 miles nearer than by the way of Good Hope. The distances to Liverpool from the most important groups of South Pacific islands north of New Zealand will be from 500 to 5,500 miles less via the isthmian canal than by way of Suez. The entrances and clearances of New Zealand's trade with northwestern Europe—France and countries farther north—amounted to 481,178 tons net registered in 1899, and the commerce of that part of Europe with the other islands of the south Pacific east of Australia to 181,743 tons. Of this total traffic of 662,921 tons, not less than 500,000 might have advantageously used an isthmian canal, and this amount should be added to the tonnage of the canal traffic originating or terminating in America. This makes the total obtained by the commission's investigation of the tonnage that might have used an isthmian canal in 1899, 4,574,852 tons net register; and the total obtained by adopting the new Panama canal company's figures for the traffic originating or terminating in America, 4,685,575 tons.

The above totals for the tonnage that might have used an isthmian canal in 1899 do not include any of Europe's trade with Australia and Japan, a part of which, for reasons stated above, would have used an isthmian waterway. The distances from Great Britain to Sidney and Yokohama by the Suez and isthmian canal routes are approximately equal, and vessels going by America in either direction en route between Europe and Japan or Australia will pass regions from which there is a heavy export tonnage. If it be assumed that only ten per cent of the vessel tonnage of the Australian trade with the ports of northwestern Europe, and only five per cent of the tonnage of the Japanese commerce with those ports would have taken an American canal route, the totals for 1899 should be increased 316,223 tons, and be raised from 4,574,852 to 4,891,075 tons, and from 4,685,575 to 5,001,798 tons, or to approximately 5,000,000 tons.

Tables prepared by the new Panama canal company show that the vessel tonnage of the commerce between Europe and Pacific America, and between the Atlantic seaboard of America and the eastern and western sides of the Pacific, increased 25.1 per cent during the decade 1888–1898, and this rate has been adopted in estimating the traffic that will be available for the isthmian canal in 1914, by which year it is assumed that the waterway will have been completed and put in operation. This rate of increase would raise the available traffic of 1899, obtained by adding to the New Panama Canal company's figures for tonnage originating and terminating in America the present traffic across the Isthmus of Panama and 500,000 tons of the commerce of New Zealand and other south Pacific islands with Europe—4,685,575 tons—to 5,861,127 tons in 1909 and to 6,555,670 tons in 1914. A growth of 25.1 per cent per decade would increase the total of 4,574,852 tons for 1899, obtained by the commission's investigation of the statistics of entrances and clearances, to 5,723,150 tons in 1909 and 6,401,343 tons in 1914—the tonnage being net register in each case.

In all probability the future increase in that part of the world's commerce that would use an isthmian canal will be more rapid than the past growth has been, because in the Pacific countries of America, in Australasia and in the Orient, the industrial progress of the next two decades promises to be much greater than that of the past twenty years has been. The rate of increase, 25.1 per cent per decade, prior to the opening of the canal probably undervalues what will occur. It is certainly a conservative estimate.

While it is not to be expected that the traffic of the isthmian waterway during the earlier years of its operation will increase so rapidly as did the tonnage passing the Suez canal, the growth in the commerce using the Suez route constitutes the best basis for estimates regarding the rate of increase in the tonnage of the commerce that will use the American canal. The growth in the traffic of the Suez canal is shown by the accompanying table, in which the tonnage total for each five-year period is given.

The tonnage of the second five-year period was 205 per cent that of the first, and the total for the third period 217 per cent that of the second. The traffic in 1880 was 3,057-422 tons, that of 1890, 6,890,094, an increase of 125 per cent; and that of 1900, 9,738,152 tons, a growth of 2,848,058 tons, or 41 per cent during the past decade. The initial tonnage of the Suez canal was small and the rate of increase during the first decade was large. Should 1914 be the first year of the operation of the American canal, and the rate of increase in the traffic during the first ten years be 62½ per cent—half that of the Suez waterway during the second decade of its use—the estimated tonnage at the beginning, in round numbers 6,500,000 tons net register, would be raised to approximately 10,500,000 tons in 1924.

INCREASE IN THE NUMBER OF VESSELS AND TONNAGE OF THE SUEZ CANAL BY QUINQUENNIAL PERIODS.

Years.	Number of Vessels.	Net Tonnage.	Per cent Increase.	Percentage which the tonnage of each five-year period is of the tonnage of 1875-1879.
1870–1874.....	4,770	5,358,237	...	...
1875–1879.....	7,684	10,995,214	105	...
1880–1884.....	14,542	23,916,374	117	217
1885–1889.....	16,726	31,430,454	31	286
1890–1894.....	17,848	39,899,143	27	363
1895–1899....	16,939	44,042,274	10	401

The extent to which the isthmian canal is used will depend in part upon the tolls charged. The commerce of western South America with Europe will continue to pass the Straits of Magellan or to round Cape Horn; the trade of the American Atlantic seaboard with Australia will keep to the Good Hope route, and the traffic between our eastern seaboard and the Philippines and southern China will remain tributary to the Suez route, if the charges for passing the American canal are made greater than the saving to be effected by using that waterway. A toll of about one dollar per ton net register could profitably be paid by the commerce between Europe and western South America, and by that of our eastern seaboard with Australia; but in both instances a much higher charge would probably cause a large share of the business to continue to be done by the routes now used. For the commerce of our eastern ports with the Philippines and the mainland of Asia between Singapore and Shanghai the distances by way of the Suez and isthmian canals will be so nearly equal that the route chosen will depend largely upon tolls. Light charges at the American canal will give that waterway a large share of the tonnage; high tolls will cause the Suez route to be used.

The Suez tolls at the present time are nine francs per ton net register, "Danube" measurement; and this charge amounts to somewhat more than $2 per ton net register, British or American measurement. The Suez tolls are levied by a private corporation, whose object is to secure the maximum revenue obtainable. With the exception of the trade between Europe and Australia, the commerce served by the Suez canal can be charged a high toll without much restricting the tonnage using the waterway; consequently a large reduction in charges would not be compensated for by the increase in traffic and the revenue would be less. It is not probable that the Suez Canal company would find it profitable to reduce its tolls largely for the purpose of competing with the American waterway.

In fixing the charges for the use of an isthmian canal, owned and operated by the United States government, the principle of maximum revenue could not wisely be followed. The revenue-producing function of the canal will be a minor one as compared with its services in promoting the industrial and commercial progress and general welfare of the United States. The exaction of tolls that would much restrict the benefits derivable from the canal would not be to the advantage of the American people.

An annual traffic of 7,000,000 tons, at $1 per ton, will produce a revenue of $7,000,000. The expenses of operating and maintaining the Panama canal are estimated at about $2,000,000 per annum. Upon this basis the net revenue would not be sufficient, at the opening of the canal, to pay interest upon the capital invested and compensate a private corporation for the risks involved. It is the opinion of the commission, however, that there are other considerations more important than revenue. It may even be expedient for the United States to reduce the tolls to an amount which will barely cover the expenses of operation and maintenance. A large increase of traffic in the future is probable, and the revenue producing value of the canal would then be proportionately greater.

THE RAILROAD'S PART IN OUR COMMERCIAL DEVELOPMENT.

BY GEORGE H. DANIELS.

[George Henry Daniels, general passenger agent for the New York Central and Hudson River railroad; he was born Dec. 1, 1842, in Hampshire, Ill.; from 1872 to 1880 he was rodman in the engineer corps of the Northern Missouri railroad, and general freight and passenger agent for the Chicago and Pacific railroad; in 1882 he became general ticket agent for the Wabash, St. Louis and Pacific, and two years later became commissioner for the Iowa Trunk Line association; the same year he became commissioner for the Colorado Railroad association; 1884–85 he was commissioner for the Utah Traffic association, and in 1886 commissioner for the Central Passenger commission; 1887–89 he was vice-chairman of the Central Traffic association, and 1886–89 he was chairman of the Eastbound Passenger commission; since April 1, 1889, he has been general passenger agent for the New York Central and Hudson River railroad.]

This is an age of transportation.

Transportation underlies material progress in every department of commerce. Without transportation, commerce would be impossible.

Those states and nations are rich, powerful, and enlightened whose transportation facilities are best and most extended. The dying nations are those with little or no transportation facilities.

Mr. Mulhall, the British statistician, in his work on "The Wealth of Nations," said of the United States in 1895: "If we take a survey of mankind, in ancient or modern times, as regards the physical, mechanical, and intellectual force of nations, we find nothing to compare with the United States."

Mr. Mulhall proved by his statistics that the working power of a single person in the United States was twice that of a German or Frenchman, and more than three times that of an Austrian, and five times that of an Italian. He said the United States was then the richest country in the world, its wealth exceeding that of Great Britain by thirty-five per cent, and added that in the history of the human race no nation ever before possessed 41,000,000 of instructed citizens.

Should Mr. Mulhall's figures be revised to-day, the difference would all be in favor of the United States, for within a few years we have demonstrated the superiority of our manufactures in every direction, and our ability to cope successfully with questions which have heretofore been handled exclusively by the older nations is now recognized by all the world.

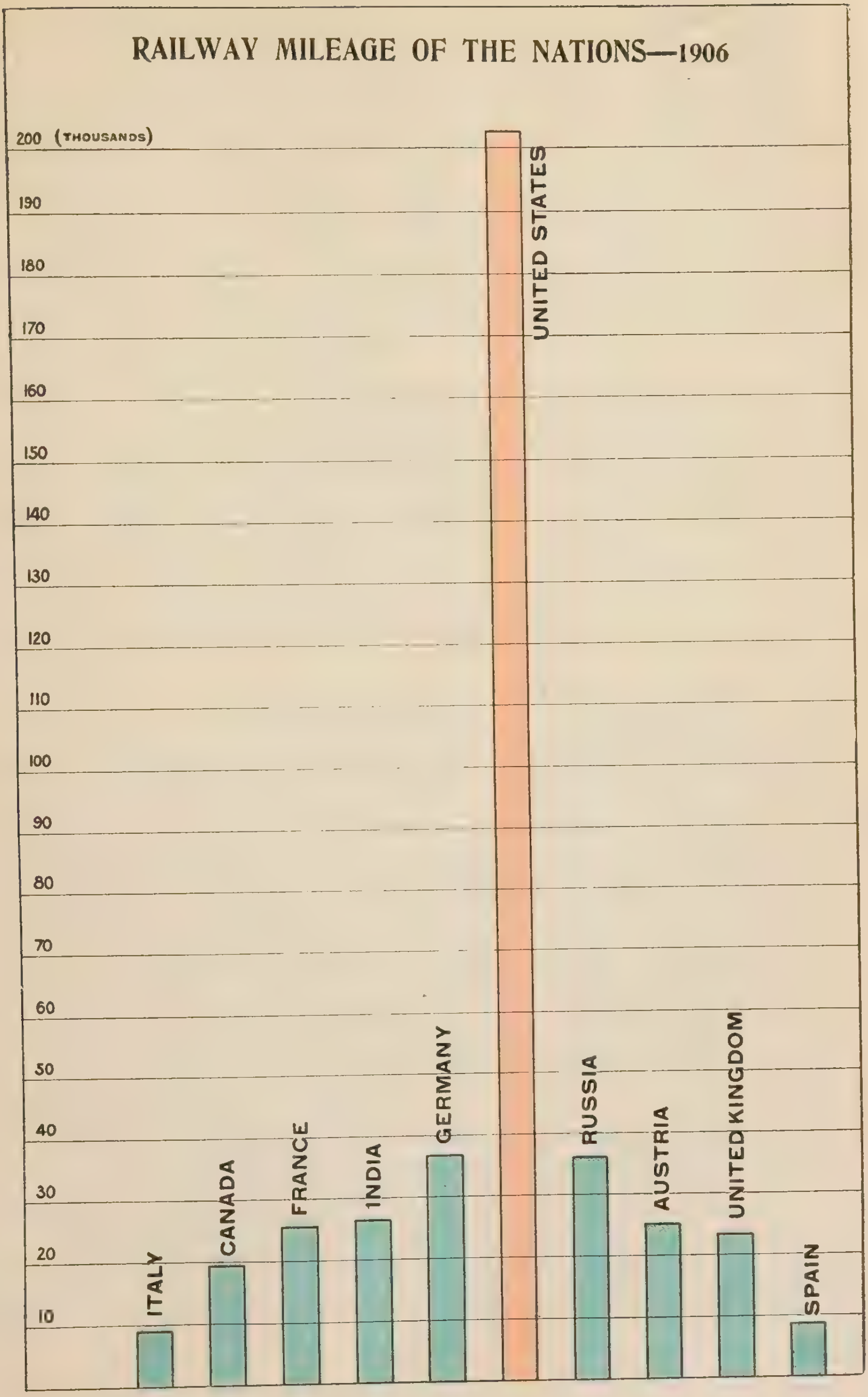
In an address before the New York State Press association about the time of the close of the war between Japan and China, I referred to the future of our export trade, as follows: "One of the inevitable results of this war will be the opening to the commerce of the world of fields heretofore unknown, perhaps the richest on the globe;" and in urging the members of the New York Press association to do everything in their power to assist in securing to the United States a portion of the great commerce to be developed between the western nations and these two old countries of the world, I asked these questions:

"Shall the grain in China and Japan be harvested by machines manufactured in the United States, or will the manufacturers of England and Germany supply them?

"Shall the fires in Yokohama and Tientsin be extinguished with engines built at Seneca Falls, or will France or England send their fire engines to Japan and China?

"Will the locomotives to haul the fast mail trains between Yokohama and the interior of Japan and through the rich valleys of China be built at Schenectady, Philadelphia or Dunkirk, or will our Oriental friends and neighbors in the Pacific buy them of our English cousins?"

I predicted that active efforts toward the extension of American commerce by commercial bodies, supported by a liberal and broad-minded policy on the part of our government, in connection with the aggressive action of the transportation companies, would undoubtedly secure to the United States the blessings that come from a great and varied commerce, and I said that the New York State Press association, and similar associations all over the country could stimulate a public spirit that would insure the important results outlined.

RAILWAY MILEAGE OF THE NATIONS—1906
200 (THOUSANDS)
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ITALY
CANADA
FRANCE
INDIA
GERMANY
UNITED STATES
RUSSIA
AUSTRIA
UNITED KINGDOM
SPAIN

At that time we had no idea that a war between one of the old nations of the earth and our young republic would be fought; at that time we had no idea that American manufacturers would be furnishing locomotives to the English railroads as well as to those of nearly every other country on the globe. No one thought nine years ago that American bridge builders would go into the open market and successfully compete for the building of great steel bridges in Egypt and in India, nor that in so brief a time American engineers would be building railroads into the interior of China from her most important seaports.

At that time no one supposed that the trans-Siberian railway would be laid with steel rails made in Pennsylvania, upon cross-ties from the forests of Oregon, and that its trains would be hauled by American locomotives; nor that this great railway, which reaches from St. Petersburg to Vladivostok and Port Arthur, a distance of more than 6,000 miles, would be completed in advance of the original expectation, as a result of the use of American construction tools and machinery.

But this is all true, and it is further true that the tools and machinery for the construction of the eastern portion of the trans-Siberian railway were supplied by American manufacturers, at a less price than Russia had been paying previously; and with this American machinery the Russians were able to do more and better work than they could perform with the machinery manufactured in other countries.

In a recent letter from a friend in Tokio, Japan, there was this significant sentence: "You will be interested in knowing that I have hanging on the wall of my office a framed picture of your 'Empire State Express,' and we expect in the near future to be hauling a Japanese 'Empire Express' with an American locomotive."

During the past ten years the three great locomotive works of the United States have built for foreign countries more than 4,000 locomotives.

In this connection it will be interesting to note in passing that the second American locomotive was built at the West Point foundry, near Cold Spring, on the Hudson river, and was called the "Best Friend," and from that day to this the locomotive has been one of the best friends of this republic.

But it is not alone our locomotives that have attracted the attention of foreigners who have visited our shores; our railway equipment, generally, has commanded admiration and is now receiving the highest compliment, namely, imitation by many of our sister nations.

Prince Michael Hilkoff, imperial minister of railways of Russia, has, since his visit to the United States a few years ago, constructed trains for the trans-Siberian railway on much the same lines as the "limited trains" of the New York Central and the Pennsylvania.

Only a short time ago, at the request of one of the imperial commissions of Germany, I sent to Berlin photographs of the interior and exterior of our finest cars and other data in relation to the operation of American railways. Several other countries have been asking for similar information, and there is a general waking up of foreign nations on the subject of transportation, brought about mainly by the wonderful achievements of the American railways.

The demand for American locomotives from all parts of the world is attributable, in the first place, to the superior quality of our machinery, and, in the second place, to the fact that the general passenger agents of the American railways have, through their advertising, made the marvelous results accomplished by our locomotives household words in every country on the globe.

It has been said that "trade follows the flag." Recent events have placed our flag upon the islands of the Pacific, directly in the natural track between the Pacific coast of the United States and Japan and China; and as we contemplate our growing commerce with these old nations we are reminded of the prophetic statement of that seer of his time, Hon. Thomas H. Benton, of Missouri, who while discussing in the United States senate the proposed construction of the Union and Central Pacific railroads said, pointing toward the Pacific ocean, "There is the east; there is India."

Previous to the construction of this artery of commerce, the route to India had been by the way of our Atlantic seaports and Europe, but with the completion of our transcontinental system of railways the route was changed, and a better way was found by way of our Pacific seaports and the Pacific ocean.

There are some who seem to think that we might get along without trade with China, and that it is a newfangled idea that Chinese trade can especially benefit the United States.

Commerce with China began 130 years ago, the first vessel sailing from New York on Washington's birthday in the year 1774. This vessel returned to New York May 11, 1775. The success of the venture was such as to warrant its repetition, and from that day to this, trade between the United States and China has continued without material interruption until it is now greater in importance and value than that of any other nation trading with China, with the single exception of Great Britain. If we are to continue as one of the great nations of the world, we can hardly afford to ignore a country that comprises one-twelfth of the land area and nearly one-fourth of the population of the globe.

One of the reasons for the introduction into other countries of our manufactures and products of all kinds, is that Americans have the ability to not only do things well but to do them quickly; and this practice, which is now general, has been greatly stimulated by the example set by the railroads.

If a New York business man makes up his mind to go to Chicago he wants to be there right away, and hence the demand for fast trains between commercial centers.

When the British government wanted a most important steel railway bridge built in India, no bridge builders in Europe would undertake to complete the work in the time required by the government, but an American bridge building corporation—a trust, many would call it—was able to undertake the contract, in consequence of the fact that through the consolidation of a dozen small plants into one great corporation, and the further fact that under the system of rapid handling of materials by our unsurpassed transportation facilities, they were able to undertake and put through a gigantic work, which appalled less enterprising and enthusiastic manufacturers. The work was completed within the time specified, and is a monument to the skill and ability of American engineers, American mechanics, and American methods.

The great steel railway bridges in Egypt were built by Americans for the same reason; and these examples are all evidences of the truth of the statement that American transportation facilities underlie much of our wonderful prosperity.

There is another reason for our strength, our wealth, and our ability to do things, and it is covered by Mr. Mulhall's brief statement, previously quoted, that "in the history of the human race, no nation ever before possessed 41,000,000 of instructed citizens."

As an illustration of the ability of Americans to send our products to foreign countries in competition with the whole world, and to show how general the use of American products and American methods have become in some of those foreign countries, let me read a few items part of which were taken from an English paper, and part I have added.

"To-day many a foreigner sits down to his breakfast made up of a cereal manufactured at Niagara falls, a beefsteak from Omaha, a slice of bacon from the Mohawk valley, and his bread, of course, from American wheat, ground at Minneapolis.

"On his way to his office, if he lives in London, he can ride in a car built in New York, propelled by electrical machinery manufactured at Schenectady, over a railway constructed by American engineers, and largely of American materials.

"On reaching his office and looking about him, he finds, if it is a modern, up-to-date establishment, this condition: He sits in a revolving chair made in Chicago; before a roll-top desk made in Buffalo; his letters are written on a typewriter made at Syracuse; he signs them with a New York fountain pen and dries them on a blotting sheet from New England; the letters are put away in files manufactured in Grand Rapids.

"Taking a day for pleasure, he attends the races, and sees the highest stakes won by an American horse, ridden by an American jockey. Looking over his evening paper, he reads of the placing in American shipyards of orders for American style battleships for European as well as Asiatic nations, and learns that the scene of the coronation of the king of England was painted by an American artist, and that the forty thousand gold, silver and bronze medals, ordered by the command of the king, to commemorate his coronation, were made in Massachusetts; and that the yacht for the German emperor was built almost within sight of the city hall of New York, and that a member of the royal family of Germany crossed the Atlantic to be present at the launching, and that it was christened by the daughter of an American president. He might also have read that the queen of England recently stood godmother to the little son of an English duchess who was born in Cincinnati, and whose father was an American railway president; and that a little later, at the celebration of the coronation of the king of England and emperor of India, at Delhi, the ancient capital of India, Lady Curzon, who was born in Chicago, rode upon an elephant, 12 feet high, at the head of a procession of more than 300 elephants, bearing the nobles of the east and the representatives of the great nations of the world; and that in this pageant, the most magnificent the world has even seen, this American woman took precedence of the brother of the king of England, occupying, as she does, as the wife of the viceroy of India, the position of 'the first lady of the land.'"

And our cousins across the water wonder why it is that Americans are able to outstrip almost every other nation in all kinds of modern achievements, and this wonder grows with each succeeding month.

Not long ago there arrived in New York a German baron, secretary of one of the German commissions, who stated that he came here for the purpose of learning why Americans do things so much better than any one else.

Since the Spanish-American war we have had commissions of various characters and sizes sent here from almost every civilized country, the object of whose visits was the same as that of the German baron. Two years ago the entire board of management of a great English railway came, six officers from the general manager to the engineer of docks, and spent several weeks in going over our railways and studying our methods. Returning to England, they have adopted many of the American methods and will adopt others, placing in service numerous kinds of American machinery, finding it better, more serviceable, and more economical than they build in England.

In all the ages of the world transportation has been, as it is to-day, associated directly with the advancement of the human race.

It began in the dawn of the world with human burden bearers; then in certain countries, the dog, the burro or pack mule; in others the horse, the camel, and the elephant; the sailing vessel, the canal boat; the steamship; the stage coach, the horse car, and the railroad.

I think it will be agreed by all that the steam railroad is the highest type of transportation; and when I tell you that all the money in the world, gold, silver, and paper, would not buy one-third of its railroads, you will get some idea of the vastness of this industry.

Railroad mileage has steadily grown until now we have more than 200,000 miles of steam railway in the United States. These railroads employ over 1,000,000 men, whose wages amount to more than $600,000,000 annually.

The earnings of American railroads last year exceeded $1,890,000,000.

In order that the German nation might have knowledge of the most advanced theories and practice in the construction and operation of railways, an imperial German commission was sent to the United States a few years ago, for the purpose of examining American railways and making such recommendations as their investigation should suggest.

In the report of this commission one of the first sentences is as follows: "Lack of speed, lack of comfort, lack of cheap rates, are the charges brought against the German empire's railways, as compared with those of the United States." They recommend the adoption of many of our methods, explaining in their report that they were far superior, not only to those in vogue in Germany, but also superior to those of any other country.

For several years the annual budgets of the Russian empire have disclosed almost incredible efforts in railway extension.

We all understand now why there was such anxiety to complete the trans-Siberian railroad, for without it Russia in the far east would be to-day at the mercy of Japan.

It is a fact not generally known that two men whose lives have been largely spent in railway service are very near to the Czar, and perhaps have a greater influence than any others in shaping the commercial policy of the Russian empire.

The first is M. de Witte, who twenty years ago was a station agent at a small town on one of the railways of Russian Poland. Gradual promotions for merit called M. de Witte to the attention of the Czar, who a few years ago made him the imperial minister of finance, and within a few months has promoted him to be practically the premier of Russia.

The other is Prince Michael Hilkoff, who when little more than a boy left St. Petersburg to seek his fortune in America, learned mechanical engineering in the city of Philadelphia, occupied various positions on American railways, and returning to his native land took the position of locomotive engineer, and as a result of the knowledge he had gained in America was rapidly promoted until he occupied the position of manager of one of the important railways of Russia, and finally the Czar, hearing of him, investigated his career and made him imperial minister of railways and a member of his cabinet.

Forty years ago, the prime minister of Japan in answer to the question, "How can we introduce civilization into the interior of Japan?" took a map and drawing lines on either side of the range of mountains which extend for some distance through the center of the island kingdom, said, "Build railroads here and civilization will follow."

This is one of the reasons for the advanced position of Japan to-day.

More than thirty years ago one of the imperial ministers of China, in a report to the emperor and empress, urged upon them the construction of a system of railways from their principal ports to the interior of the empire. In his report he used this significant sentence:

"Japan, which is a mere speck upon the map, is building railways, and her people are being benefited thereby. Should not your celestial empire, which comprises one-twelfth of the land area, and one-quarter of the population of the globe, do as well as this handful of people among the islands of the sea?"

To-day this suggestion is being carried out, and railroads are being constructed in a dozen different directions in China.

One hundred years ago the governor of the great state of New York advised his friends not to invest their money or waste their time in aiding to build railroads, expressing the opinion that, while it was possible that improved methods of construction and perfected machinery might, in the remote future, enable the people to move a car upon a railroad at the rate of five or six miles per hour, he did not believe that they could ever be made of material advantage, and that any attempt to transport passengers and freight by railroad, from one part of the country to another, must result in endless confusion and loss. The governor died in the belief that the canal was the only means of conveyance for a great commerce.

Less than a quarter of a century ago, upon the average American railroad, the capacity of a freight car was twenty thousand pounds; the capacity of a freight engine was from twenty to thirty of such cars to the train.

To-day on the New York Central, the capacity of the grain cars is from 60,000 to 80,000 pounds, and a locomotive of the latest type will haul from 75 to 90 such cars loaded to their full capacity. It is not an infrequent occurrence for a single engine to haul through the Mohawk valley 85,000 to 90,000 bushels of grain in a single train. The same engine will haul from 110 to 125 empty cars. When you consider that in the busy season there are from 75 to 100 such trains a day passing over the New York Central alone, you will get some conception of the growth of our traffic.

There is a general demand on the part of the American public for quick time for the movement of freight trains as well as for passenger trains. A shipper having 1,000 barrels of flour or 500,000 bushels of grain for export must often get it to the seaboard within a specified time. One illustration will suffice:

A lake steamer arrived in Buffalo on a Friday evening loaded with grain, while the big White Star Line steamer "Cevic" was at her pier in New York about to sail with water for ballast, unless she could get a cargo of grain.

This grain from the lake steamer was quickly transshipped at Buffalo to the cars of the New York Central, left Buffalo Saturday evening, and was in the hold of the "Cevic" at noon on Monday. The dispatch with which this grain was handled makes a record that has never been equalled.

In an address before the chamber of commerce of Rochester some time ago, I cited an illustration of the effect upon a locality of the evolution of modern railway transportation.

In 1822 Thurlow Weed, one of the great newspaper men of his day, wrote of what is now the city of Rochester, as follows:

"Rochester is a straggling village containing about half a hundred inhabitants, but it is a go ahead place, and from its advantages is destined to become an important inland town."

At that time Rochester's only means of transportation was the Erie canal, and the difference between the insignificant village of Rochester in 1822 and the magnificent city of Rochester to-day, is the difference in its transportation facilities; and this difference is strikingly illustrated by a comparison of the canal packet towed by a mule at the rate of four miles an hour, and the Empire State Express thundering through the Genesee valley at a speed of sixty miles an hour.

American railway management is always alert and ready to embrace every opportunity for extending the commerce of the country, and railway men are among the very first to seize upon each coign of vantage. Within a week from the day that the Paris peace commission adjourned, an American railway had ordered the re-engraving of its maps to include the West Indies, the Hawaiian Islands, and the Philippines. The description of the beauty of our American lakes and valleys, the magnificence of our rivers, the grandeur of our mountains, the fertility of our soil, the wealth of our mineral resources, and the superiority of our manufactures, with which our railroad advertising is filled, has been of incalculable value to the export trade of the United States. It has induced thousands of foreigners to visit every section of our country who otherwise would never have come here. It has been the means of the investment in the United States of untold millions of foreign capital. It has been one of the strongest aids to the expansion of American commerce in every direction.

Henry Drummond said of the nineteenth century, that it had added more to the sum of human learning than all the centuries that had passed.

The twentieth century bids fair to keep pace with, if not surpass, the nineteenth.

A few examples of the achievements of American railroads in a little more than half a century, and many of them within the last twenty-five years, cannot be inappropriate.

Before the railroads were built it took a week to go from New York to Buffalo, nearly three weeks from New York to Chicago; and at that time no man would have thought of making a trip from New York to the Pacific coast, except a few of the hardiest pioneers; and when on such occasion the goodbyes were said, it was expected that it would be forever. If to-night you should place a letter on the Pacific and Oriental mail train which leaves Grand Central station, New York, at 9:15, you may be sure that your correspondent in San Francisco will be reading it next Saturday night—four days from New York.

You can to-day take your luncheon in New York, leisurely pack your bag, and, taking the train at Grand Central station at 3:30 P.M., be in Chicago at 8:30 the next morning, a distance of 980 miles in just eighteen hours.

The framers of our constitution would have considered a man beside himself who would have suggested such a possibility.

In 1875 the states east of the Missouri river were sending food and clothing to the starving people of Kansas.

Thanks to the facilities afforded by the railroads, the corn crop of Kansas for 1902 covered 7,000,000 acres and yielded over 200,000,000 bushels, the value of which was more than $78,300,000.

Irrigation in Kansas is making great headway, and its successful introduction in the remaining 45,000,000 acres will enable the future Kansas to raise 2,000,000,000 bushels of corn.

It seems a very few years since I made my first trip to Colorado, and stopped on my way at the home of Buffalo Bill, at North Platte, Neb., on the Union Pacific. At Ogalalla, fifty-one miles west of North Platte, the Sioux Indians were roaming over the prairies and making more or less trouble for the settlers who ventured so far out of the beaten paths of civilization.

The Nebraska corn crop of 1896 was the largest ever raised in that state. It covered 8,000,000 acres and yielded 298,000,000 bushels.

After irrigation is applied to Nebraska, nearly all of its 50,000,000 acres being tillable, that state will practically equal Kansas, and the two together will raise enough corn to supply the entire world.

Previous to the construction of the Northern Pacific, the Great Northern, Northwestern, St. Paul, Burlington, Rock Island, and other railways that traverse that wonderful region known as the "wheat belt," there was nothing to be seen but prairie grass and an occasional band of untamed savages.

Minnesota and North and South Dakota in 1903 shipped 173,000,000 bushels of wheat.

In 1849 there came wafted across the continent reports of the discovery of gold in California, but the only means of reaching its golden gate was by sea around Cape Horn, or the long and perilous journey, with ox teams, across the plains, including what was then styled in our geographies the American desert, and through the hazardous mountain passes of the west.

The completion of the Pacific railroads changed all this, and opened new fields for all kinds of enterprises, in an unexplored territory stretching over more than two thousand miles to the west, northwest, and southwest of the Mississippi river, the products of which region were practically valueless until the means of transporting them were provided by the railroads.

The wheat and barley crop of California in 1903 was 38,000,000 bushels. The largest wheat crop ever produced in California was in 1880, when, owing to exceptionally favorable weather conditions, that state produced 63,000,000 bushels.

The mineral product of California for the year 1902 amounted to $35,000,000. In addition to this thousands upon thousands of carloads of fruits, vegetables, wines, dairy products, beet sugar products, hops, wool, and lumber, are produced each year.

The vineyards and orange groves of California would be of practically little value were it not for the fact that the railroads, by their fast trains of refrigerator and ventilated fruit cars, make it possible to transport the products of her fertile valleys to all sections of the country.

It seems but yesterday that the railroads were completed into Portland, Ore., Tacoma, and Seattle, Wash., and it is marvelous that for the year 1901 there was exported from the Columbian river valley and the Puget sound region 33,000,000 bushels of wheat.

Oregon and Washington form the northwest corner of the territory of the United States, south of the line of British Columbia, and are directly on the route to our extreme northwest possession, Alaska.

Oregon is as large as the six New England states with New York added; it contains 95,000 square miles, or nearly 62,000,000 acres. This wonderful empire with only one-seventh the population of the city of New York is the largest exporter among the states of hops, wool, lumber, wheat, mohair, and salmon.

The wheat crop of the states of Oregon and Washington for the year 1901 was 47,000,000 bushels.

Colorado, which, with its inexhaustible mines of gold, silver, lead, iron, and coal, forms almost an empire in itself, produced in 1902, of gold, $29,000,000; of silver, $8,000,000; and of lead, copper, and zinc, $7,000,000, in addition to a magnificent crop of wheat, fruit, and vegetables.

Thanks to her railroad facilities Montana is to-day the richest mineral region of its size in the world.

The value of the precious metals mined in Montana during the year 1899 was the largest in its history, and amounted to $68,500,000.

The state of Montana produced in that year 23⅓ per cent of the copper product of the world, and 61 per cent of the copper of the United States. It is said that mineral development in Montana is in its infancy, and that what it has already produced is but a bagatelle of the output of the future.

Without railroads, Kansas, Nebraska, Minnesota, North and South Dakota, Montana, Colorado, California, Oregon, and Washington would still be the home of savages.

One of the loneliest things upon which the human eye can rest is an Indian tepee. It is made of a few poles stuck into the ground, and covered with old canvas, blankets, bark, or untanned hides, with a hole at the top to let the smoke out. An Indian tepee represents all there was of religious, educational and industrial development in the vast territory west of the Missouri river previous to the advent of the railroad, which is one of the greatest civilizing agencies the world has ever known.

It is beyond question that American railroads to-day furnish the best service in the world, at the lowest rates of fare, at the same time paying their employes very much higher wages than are paid for similar service in any other country on the globe.

In the United States the first class passenger fares in 1903 averaged 1.98 cents per mile, although on some large railways the average was several mills less than two cents per mile; in England the first class fare is double ours, third class fare for vastly inferior service is two cents per mile.

In Germany, Austria, and France, the first class fare is three cents or more per mile.

Our passenger cars excel those of foreign countries in all that goes to make up the comfort and convenience of a journey.

Our sleeping and parlor car system is vastly superior to theirs; our baggage system is infinitely better than theirs, and arranged upon a much more liberal basis—American railroads carry 150 pounds of baggage free, while the German roads carry only 55 pounds.

For round the world or trans-Pacific passengers, we carry 350 pounds free.

The lighting of our trains is superb, while the lighting of trains on most foreign lines is wretched.

Mr. Guy Morrison Walker, the American statistician, in his article on American Labor's Debt to Railroads, which is published in the eighth volume of this work, explains that there is a direct relation between the cost of transportation per ton per mile and the rate of wages, and gives some interesting figures.

In China it costs 10 cents per ton per mile to transport freight. The wages per day in China average 10 cents. In Japan it costs 5 cents per ton per mile and the wages are 23 cents per day. It Russia it costs 2 cents and 2 mills per ton per mile and the wages are 34 cents per day. In the United States the average rate is a little less than 7 mills per ton per mile, and the average wage is $2.60 per day. That is where we have the greatest railroad mileage in proportion to our population and the lowest cost of transportation, we have the highest average wage to be found in the world; the highest wage, in fact, of which there is any record.

I may be pardoned for citing a few examples of what I mean by the unsurpassed passenger train facilities of American railways.

A single locomotive recently hauled a passenger train of sixteen cars, nine of which were sleeping and parlor cars, from New York to Albany, a distance of 143 miles, in three hours and fifteen minutes, which is 44 miles per hour, and is the regular schedule time of this train. The train weighed 1,832,000 pounds, and was 1,212 feet, or nearly a quarter of a mile, long.

The empire state express was placed in service October 26, 1891, and since that day it has been the most famous train in the world.

For years this train has been making the run from New York to Buffalo, 440 miles, in eight hours and fifteen minutes, at an average speed of $53\frac{1}{3}$ miles an hour, including four stops —two of them for changing engines—and twenty-eight slow downs, on account of running through incorporated towns and cities.

For more than 216 miles of the 440 miles it makes the run on every trip at an average speed of more than 60 miles per hour. For one stretch of ten miles the regular schedule time is 66.33 miles an hour.

The weight of this train is 854,000 pounds, and it has a seating capacity of 248 passengers.

On June 15, 1902, the New York Central placed in service the twentieth century limited, which now runs every day in the year between New York and Chicago, 980 miles in eighteen hours, an average speed of nearly 54 miles per hour including all stops and slow downs, and saves the business man a day.

Recently the twentieth century limited on the Lake Shore covered the 134 miles between Brocton and Cleveland in 131 minutes. From Cleveland to Toledo the engineer pushed along over the 113 miles in 103 minutes, reaching a speed of 90 miles an hour at some points.

These are some of the achievements of American railways in passenger service, and in my opinion it is achievements of this character that have made it possible for the United States to expand its commerce with such astonishing rapidity.

The fact that American passenger service attracts the attention of people of every other country who visit our shores is demonstrated by the desire of all foreigners to ride on the empire state express and the twentieth century limited—the fastest long distance train in the world—and the further desire to examine the magnificent machines that haul our great trains.

The extent of our commerce, both domestic and foreign, may well astonish the representatives of other lands who visit us for the first time, but the extent of the territory of the United States made possible by the negotiations of Admiral Dewey in May, 1898, supplemented by those of the peace commission at Paris, will surprise our own people, as well as our cousins from across the water.

We thought before the purchase of Alaska that our territory was large, but what vistas of commercial enterprise present themselves to us as we contemplate the situation to-day.

It is 3,895 miles from Van Buren, Maine, to San Francisco, California; 3,144 miles from San Francisco to St. Michael's, Alaska, where an empire in extent awaits development by American capital and energy. It is 7,729 miles from San Francisco to Manila, island of Luzon, and this is only one of hundreds of rich islands in our Philippine group that await similar development. In contemplating the extremes of our domains we should not overlook the Hawaiian and other islands which lie in our new ocean pathway.

With a knowledge of the fact that the Philippine islands contain forests of mahogany and other valuable woods, inexhaustible mines of coal and other rich minerals, shall we wonder that American railroads are seeking connections that will secure a portion of the commerce that must come from the development of this rich region, which has so recently been added to the territory of the United States?

If it is true that "trade follows the flag," then with cooperation and reciprocity between the great transportation interests of the United States and the commercial and industrial interests of our republic, and with proper encouragement given to American shipping by the congress of the United States, our commerce should be as diversified as are the products of our soil, our mines, and our mills; and our export trade should reach every mart on the earth, and should flourish on every sea and river where vessels ply; for since the almost miraculous events in Manila bay and at Santiago, we may say of our flag, "it floats forever in the sun."

THE PAST, PRESENT AND FUTURE OF AMERICAN RAILWAYS.

BY MELVILLE E. INGALLS.

[Melville Ezra Ingalls, president of the Big Four Railroad system; he was born Sept. 6, 1842, in Harrison, Me., and brought up on a farm; he was educated at the Burlington academy and Bowdoin, and was graduated from Harvard Law school in 1863; soon removing to Boston he practiced law there, and became a member of the Massachusetts senate in 1867; in 1880 he was president and a year later receiver for the Indianapolis, Cincinnati and Lafayette railroad, out of its bankruptcy organizing its successor, which in turn was consolidated with other roads into the Cleveland, Cincinnati, Chicago and St. Louis railroad, whereof he is president; in 1888 he was elected president of the Chesapeake and Ohio railway company, continuing until 1900; in 1903 he was chosen democratic candidate for mayor of Cincinnati, and was defeated in the campaign.]

In the year 1830 the first complete railway was put in operation. There had been many experiments leading up to this; in fact, in the world's history, all great improvements or inventions do not appear at once, but are attained by gradual steps and often appear in different places and through different persons, as though the idea had filled the air, as it were, and different places commenced to work on the same line. The world was ready at that time for something new. For the century ending with the year 1815 and the great and decisive battle of Waterloo, the civilized world had been in a constant strife. Hardly a year had passed in which one or more of the great nations of Europe were not at war, and for much of the time all of them. The governments had been managed for the benefit of the few; the condition of the common people had been almost hopeless; every dollar that could be wrung from them by the most onerous taxation in the world had been used to build up armies and navies with which to fight. So oppressive was this system that in 1789 the French revolution broke out with its terrors. The people became like some wild animal liberated from his cage, and, knowing nothing of how to use that liberty, simply struck around in their fierce anger and destroyed whatever came in their way. Wise men, timid men, lovers of liberty, became frightened and disgusted. Reaction came, and on it Napoleon climbed to power. He soon lost his head and endeavored to rule the world, and the contest to crush him lasted for a score of years.

In those years there was no opportunity for industrial improvement. No one attempted to accomplish anything except to fight or to provide for the necessaries of existence. When finally, in 1815, peace came to the civilized world, it dawned upon nations poor, weak and wounded. The condition of the poor was deplorable, and that of the rich not much better. The facilities of communication, even in countries of the highest civilization, at that time were very limited. For instance, the news of the battle of Waterloo did not reach London until three days afterwards, and it was then printed in the newspapers and sent over England in mail coaches that ran night and day, at the rate of seven or eight miles per hour.

In the few years of rest from war, between 1815 and 1830, which they had enjoyed, the people had done some work, and more thinking. In France the Bourbons with their despotic notions were driven out, and in England the people secured the "reform bill," so-called, and it was beginning to be understood all over the civilized world that governments were for the people and the divine right of kings to oppress and misgovern was disappearing. Slowly, as the nations began to recover from their exhaustion, they devoted their time and energies to industrial improvement.

The men in active life in 1815 knew nothing but war and its adjuncts. In 1830 a new generation was upon the stage, ready for another purpose. George Stephenson's railway was completed and civilization was ready to take it up and carry his ideas forward and beyond even his fondest dreams. In sixty seven years this weakling has grown to be a giant of immense proportions, and has added vastly to the comfort and happiness of mankind.

In 1830, when the first railway was opened, travel over any of the civilized countries of the world was slow and wearisome. Communities which to-day are neighbors, then knew but little of each other. England was the richest of the nations and the highest in civilization, and yet a writer at about that time, describing its internal affairs, says, "Each little community set apart from its fellows, following its own customs, cherishing its own prejudices, feeding its own traditions, speaking in a dialect which men from a distance failed to understand; a stranger was ipso facto an enemy."

In our own country at this time civilization was even more backward. The people had settled and clustered along the coast and the great lakes and rivers, but the means of communication were slow and wearisome. At this time came the railway, and its development has been one of the greatest industrial revolutions in the world's history. One writer truly says, "It has enabled men from different sections to meet freely, to learn how little there is on either side to hate and how much to love; ancient prejudices melt away by the fuller knowledge gained from travel and acquaintance; each year as men associate with each other and travel, the unity of the people becomes more and more perfect."

While railways have benefited Europe and all civilized nations they have proved more of a blessing to America on account of its great distances. American genius also seems to be peculiarly adapted to the science of transportation and railroading. We have worked out in this country the most perfect system of transportation known on earth. In England the railways have had the benefit of unlimited capital, and in some respects may be in advance of ours. The journeys there for short distances are more comfortable, but their system, if applied to our long lines, would be an utter failure. A trip to-day from New York to Chicago is not a thing to be dreaded, but a pleasure to be anticipated. With the trains and service, you have (in the parlance of railway advertising) "all the comforts and luxuries of home." The 3,500 miles between New York and San Francisco are covered in less than five days, with ease; so that even our invalids can avail themselves of the different climates and not grow weary with the journey. The expense of a journey to-day is not one fifth of what it was in the old days of stage-coaching, saying nothing about time and comfort. Beyond any human calculation, however, is the benefit derived from association and the facilities of communication between different sections of the same country. It has enabled the American republic to grow beyond any thought or prediction of its founders, and has rendered distant sections homogeneous to each other which otherwise would have been distant and unknown countries. It is hard to realize what would have happened in this country of ours if the railway systems had not been perfected.

More, however, than in the facilities of travel has been the growth of the freight traffic of the various systems. The industrial enterprise that started a half century or more ago, by the aid of a few enthusiasts who were themselves doubtful of its success, has now grown to fabulous size; 206,885 miles of main track; 286,262 miles of all tracks. The little locomotive that George Stephenson ran from Manchester to Liverpool is now represented in these United States by 44,529 monster machines; 1,524,150 cars are in service; 696,949,925 passengers were carried in the year 1904; 1,306,628,858 tons of freight were handled; the number of tons of freight carried one mile was 171,292,198,079.

These figures are almost beyond the conception of the human mind; and all this freight was moved at an average charge of four fifths of one cent per ton per mile. Think of it! A ton of freight hauled one mile at a charge of four fifths of a cent. The gross earnings of all the railways in 1903 were $1,908,857,826. The number of employes upon the payrolls of the companies in 1903 was 1,312,537. If you take into consideration those not upon the payrolls but deriving their support from the railways, and consider also the manufacturers of supplies used by the railways, you will probably treble this number. In other words, an army of nearly 4,000,000 of men are engaged in railway business, and more than 18,000,000 of our population are supported by this industry.

I have said that it cost four fifths of a cent per ton per mile to handle this immense amount of freight, but this is the average charge. The great products of the country, like flour, corn, wheat, coal and iron, are handled for less than one half this charge, and this low cost has enabled this country to develop its manufactories and its commerce, until it stands foremost among the civilized nations of the earth. Three hundred and fifty two million three hundred and sixty five thousand one hundred and ninety two tons of coal were mined and moved by the railways in this country in 1903. With the opening of the century we stood first in the world in the mining of coal, the production of pig iron, the manufacture of flour and the production of wheat and corn. The world stands aghast at our growth, and the great factor in such increase has been the railways.

In the beginning of railway development capital was scarce and but few people were willing to invest in such a hazardous business, and the need of the communities was so great that any extraordinary concession asked for was quickly given. Even then, the first promoters lost nearly all of their investment. But few of the great trunk lines which were constructed previous to 1855 were enabled to go through the panic of 1857 without bankruptcy; stocks of some of the best roads in the land, and which to-day are paying large dividends, went down to five and ten cents on the dollar, and many of them were entirely wiped out by foreclosure proceedings.

With the close of the war in 1865 a new and enormous development commenced in railway building, and there came to the front then a practically new class of business men known as railway promoters. It was no unusual thing for these men to take contracts for building hundreds or even thousands of miles of railway. Their plan was to procure the most favorable charters from the states or the government, to obtain large concessions in lands along the line, then organize a company, issue as many bonds per mile and as much stock as they thought the public would take, obtain from cities and towns as large subsidies as possible in money and promises; then make contracts with themselves by which they received all the lands, subsidies, bonds and stock, for constructing the railway. They constructed it as cheaply as possible; they sold the lands for the best price obtainable; sold the bonds and stocks to the public; and then marched on to take other contracts and conquer other lands.

When the day of reckoning came, as it was bound to, the public found themselves the owners of bonds upon which the interest could not be paid; the communities found themselves with a poor railway in which they had no direct pecuniary interest; they saw the contractors with enormous fortunes, and they concluded that they had been cheated and robbed. Hence, through their legislatures and city and town governments, they began to get back at the railways by imposing onerous taxes and obligations and by attempting to fix rates of fare and freight by legislation. This was the start of the so-called "Granger legislation" in the 70's. This legislation went through the various states and finally, in 1886, congress passed the interstate commerce law, and since that year the difficulties have been more with reference to that law than with state laws. That law practically prohibited contracts among railways for the maintenance of tariffs; or, to be exact, it prohibited pooling, which is an agreement between two or more competing lines to divide the business in certain proportions; it being the judgment of railway managers then, and to-day, that in no other way can permanent and fair rates be obtained except by such division of business.

Two individuals in trade can quarrel and sell goods below cost, and one of them soon becomes bankrupt and the other then employs him and holds all the business; but railways being public corporations continue to exist, and when they fail are managed by a receiver and become worse competitors than ever. It is said that the public get the benefit of this competition, but only a certain portion of the public. The large shippers are able to take advantage of this condition of affairs and make their contracts, avoiding the law through one way or another, and then they can undersell the small shipper, and drive him out of business, and the result is the disappearance of the small shipper, the small manufacturer, and the growth of the larger. This is also true of commodities; the effect of the interstate commerce law has been to build up places like Chicago and break down small interior cities.

The condition of affairs apparently culminated in the decision of the Supreme court of the United States in what was known as the "trans-Missouri" case, in which that court held that the Sherman anti-trust law applied to railways, and therefore practically any association or agreement was illegal. Following that decision the railways were thrown into a chaotic state, rates were irregular, earnings diminished, and the public suffered; investors became frightened, foreigners sent home and sold our bonds and stocks; and out of these troubled times grew the business of reorganizing railways, until nearly one third of the mileage of the country was sold under the hammer and reorganized. The old stockholders lost their investment or else secured a new interest by paying large assessments.

In addition to this, the different states and cities and counties inaugurated a system of taxation by which all bonds and stocks of railway companies have been subject to listing and taxation, although the corporation paid the taxes upon the property itself. That is, a party in Indiana owning bonds or stocks in a railway is compelled to list them and pay taxes upon them, while if he lived in New York he would not. You can see at once that the Indiana man will sell his securities to the New York man, for, while the rate of taxation may be light, it is enough to change the investment. The result has been that the local communities have sold their bonds and stock; the investments have drifted to Wall street, and the bonds and shares of our principal railways are to-day used simply as counters are used in a game of cards, to mark the speculative gains or losses of the holders. This is the most unhealthy condition to which a great business enterprise can arrive, and we must bear in mind in considering this question that there is no one business that involves so much the prosperity and happiness of the people as that of the railways; the entire community uses them.

The railways of this country, as already stated, employ more than a million of men in their operation. There are more employed directly in the manufacture of supplies which are used by the railways, and this army of men, with the families dependent upon them, constitute about one fifth of our population, all of whom are dependent upon the railways. The prosperity of the railways is their prosperity; the loss of the railways is their loss. There can be no prosperous times in this country unless the railways prosper. No body politic can be healthy when one fourth or one fifth of it is diseased.

What is the future? There must be changes in legislation and in the management of railways. Some plan must be adopted to increase the ownership in railways by parties residing along their lines. The first step towards doing this must be a reform in the tax laws, so that citizens of Indiana or other states can be put upon as favorable terms for ownership of bonds and stock in a railway as citizens of New York. Greater permanence must be given to the condition and ownership of railways.

It would be a great step if we could adopt the English method and create debentures instead of bonds; or, in other words, provide that there should be no foreclosure for nonpayment of interest. Such a thing as foreclosure of a railway in England is unknown. If the interest is not paid upon the debentures, there may be a receiver of the profits, but the stockholder still holds his interest in the property. Here, with our system of bonds, if there come a few bad years, when the interest is defaulted, the bondholder takes possession and sells it under his mortgage, the interest of the stockholder is extinguished, and when prosperity returns he has lost his opportunity to get his share of it. This makes the possession of railway stocks speculative and uncertain; in fact, for years they have been more subject to assessments than to the receipt of dividends. If our form of mortgage could be changed to that of the English debenture, it would stop the immense number of reorganizations, and would prevent values being wiped out in times of panic, and would encourage investment by the people in the securities of these enterprises—for, after all, that is the real improvement that is to come.

The New England railways have less trouble with legislatures and courts, chiefly because they have a great many small holders of stocks along their lines and in the cities, each of whom is an agent of the corporation and aids in creating public sentiment and procuring fair treatment, while in the great central states and in the west there are scarcely stockholders enough to provide the officers for a stockholders' meeting.

The railway officials themselves must be taught to conduct their business with care and with due respect to the rights of the people. Their actions must not be secret, but above board and open to the public. There must be but one rate to everybody, and that must be reasonable, and the legislatures must provide remedies by which railway officials can agree with each other on these rates and their contracts can be enforced.

The present state and national laws in reference to railways are crude and crazy patchworks, passed in some cases out of revenge for wrongs, real or fancied, and in others for political effect, and all in opposition to the railways. Unfortunately, railway officials have opposed all legislation that looked to the control of their powers, and have not tried to direct and perfect the laws as they might have done. There should be clear and positive legislation authorizing railways to contract with each other for the maintenance of tariffs and the division of business, and it should be made the duty of the government commissioners, and they should have the power in such cases to see that rates are reasonable, and their decisions as to whether reasonable or not should govern, subject to appeal to the courts.

The improvement of the country demands that the great articles of export, like cotton, wheat, flour, corn and meats, should be carried at the lowest possible rates. The railways should pattern after the English system, and while making extraordinarily low rates for these great articles, should exact a terminal upon the higher classes of freight and upon freight carried short distances, so as to provide interest upon the immense terminals they have to have. In other words, while a railway from Chicago to New York may possibly haul corn for fifteen cents per hundred pounds without loss, it could not haul it for 100 miles on anything like a proportion of this rate without great loss. The same is true of many articles that enter into railway traffic. Therefore, in order that the country may be benefited by having its great articles of export and of manufacture carried cheaply, there should be a terminal charge affixed to other traffic which would enable the stockholders to receive something for the very large investment they have to make in every city and town for facilities wherewith to do their business.

Passenger rates are made entirely upon the wrong basis. We charge the same for the man who rides in the palace car, and for whom the railway has to haul two tons of dead weight, as we do for the man who rides in the ordinary coach, and for whom only one half a ton of dead weight is hauled. We charge practically the same for the passenger who is carried sixty miles an hour on the fast and expensive train as we do for the passenger upon the slow and less expensive train. These rates should be changed and graded.

Above all, a better understanding must be arrived at with the vast army of employes. They must have greater interest in the success of the railways, and they must be a part of the power that will produce a better understanding with the communities which the railways serve. This must be done by a system of hospitals, pensions and profit sharing.

Probably locomotives propelled by electricity will come in the future. If not, something else may. And we can not tell what the next years have in store in the way of improving our railway facilities. Higher speed, possibly cheaper trains, but it is necessary to this country of ours that the railways should be encouraged, so that they may go on improving their systems, so that branch lines can be built to every county seat in the country. Instead of stopping at 206,885 miles of railway we should build at least five thousand miles a year in short and inexpensive lines as feeders to the main systems, so that the days of the stage coach and the heavy wagons should be unknown.

This country will soon have one hundred millions of people. It will require at least 250,000 miles of railways to serve them properly. They can not be built, they can not be improved and increased, with the present system of legislation, and with the present prejudice against them. The development of the country demands that this must be changed.

In the centuries that have gone, the youth of the various countries sought fame and preferment in war and its accompaniments. We live in better days and in a higher civilization, but the service of our railways offers a wider field for advancement, and for fame, than anything of old. The road to success in this line is not through carnage and suffering, but it is none the less sure and requires equally moral courage and intelligence. A new evangel must be preached in reference to railways; they must be placed upon a higher order, and instead of being pariahs in business, they must be the benefactors and friends of all.

BEWILDERING STATISTICS OF AMERICAN RAILWAY OPERATION.

BY GEORGE B. WALDRON.

[George B. Waldron, author; was born March 3, 1868, at Philadelphia; educated in the public schools of that city; began his business life as a reporter on the New York World and later devoted his attention exclusively to writing for the magazines and technical periodicals. Author of American Railways. The following article appeared originally in McClure's magazine and is published by special arrangement.]

Copyright 1901 by S. S. McClure Company

When George Stephenson taught the world how to make a steam engine propel itself along parallel rails, he opened a new chapter in industrial development. But no doubt even his sanguine mind did not apprehend that some then living would see these shining bands of steel binding whole continents as one people, and almost the entire globe in one commercial union.

Seventy-seven years ago there was not a mile of steam railroad in the United States, and even a half century ago there were but 6,000 miles. At the close of the rebellion, the mileage was only 40,000; but it jumped to 80,000 in 1878, and to 150,000 a decade later. To-day 550,710 miles of railroad interlace the earth's surface, of which 206,885 miles are in our own country. Add the second, third, and fourth tracks, the terminals and the sidings, and the aggregate in the United States reaches 286,267 miles, or enough to complete one gigantic span from the earth to the moon.

Were this roadway equally distributed over the nation's territory, there would not be a spot on the entire 3,000,000 square miles more than eight miles distant from some road. This mileage, however, is far from equally distributed. While for each hundred square miles of territory in New Jersey, Massachusetts, Ohio, Pennsylvania, Connecticut, Rhode Island, and Illinois there is from twenty to thirty miles of railroad, the vast western empires of Idaho, Nevada, Wyoming, Arizona, New Mexico, and Oklahoma have already one mile for each hundred square miles of area. Those states lying north of the Ohio and the Potomac, and east of the Missouri, comprising more than half the nation's population, but less than a fourth of the territory, have fully half of the mileage.

The ownership of this choice treasure is distributed among about 800 independent companies, whose roads range in length from a few hundred feet to above 6,000 miles. A bare dozen of the companies control a quarter, and a score own a third, of the entire mileage.

For the equipment of the roads 44,529 locomotives are required. These draw 28,830 passenger and baggage cars and 1,524,150 freight cars. Were all the road engines in use at one time, there would be an average of one train on every six miles of road the country over. End to end with all the cars attached, they would make one solid train over 9,000 miles long, or nearly three times the distance from New York to San Francisco.

Nine hundred and ninety nine million, nine hundred and eighty three thousand miles is the aggregate distance made by these trains in the year, a figure beyond human conception. This mileage represents ten trips from the earth to the sun, and over three thousand to the moon. It means an average of 2,739,671 miles a day, nearly 115,000 each hour, and a train girding the earth at the equator every fifteen minutes.

But each of the passenger trains on the average carries forty passengers, making the aggregate distance traveled by individuals fourteen thousand million miles. This represents 4,000,000 trips from ocean to ocean, and nearly 600,000 journeys around the world; or one every minute of the day and night during the year. At the average rapidity of travel the total time spent on trains during a single year by the American people aggregates 80,000 years.

Equally striking are the facts as to the movement of freight. Not less than 800,000,000 tons are transported an average of 125 miles, making a total, during the year, of one hundred thousand million ton miles. Load this freight into one solid train, and it would fill 40,000,000 cars, which would cover every mile of track in the country. Store the goods in dwelling houses, and those transported during one presidential term would crowd from cellar to garret every dwelling in the United States.

To move this enormous freightage there is needed an army of some 1,200,000 employees. One in twenty eight of the working population of the nation is employed in railroad service. Their earnings aggregate nearly a half billion dollars. With their families and those of workers in the allied industries furnishing needed supplies of all kinds, probably 5,000,000 people draw their support from the railroads.

In making a trip of 1,000 miles across the country on main trunk lines, two or three station agents may sell a passenger tickets, half a dozen gatemen and porters aid him in getting aboard his trains. Four or five conductors and as many more trainmen may minister to his comforts on the journey. He may catch sight of the engineer and firemen, oil stained and grimy, in their cab. But for the score of railroad men he sees on the way, there are 10,000 whom he may never see. To operate a thousand miles of road in the eastern states requires over 900 engineers and firemen, 1,400 conductors and trainmen, 1,300 station men, 600 switchmen and flagmen, 1,900 trackmen, 2,200 in the repair shops, and 400 officials and clerks in the central offices. Of the hundreds of thousands employed on the railroads in this country, not one in four is actually in train service.

Consider the financial side of the nation's roads. In building and equipping the 286,000 miles, there have been issued six and a half billions of stock, and an equal amount of bonds. Add another billion for floating debt, and the total securities aggregate thirteen thousand millions, or about one sixth of the entire wealth of the nation. Distribute these securities equally among the people, and to each family would fall about $900. Turn this wealth into gold, and 20,000 teams would be needed to carry away the precious metal. But the entire gold stock of the world is not large enough to purchase more than a third of the roads of this one nation.

From the operations of these thoroughfares the gross annual revenues reach $1,900,000,000, about one fourth of which comes from passenger traffic. This is more than ten times the entire annual product of the gold and silver mines of the country. Add the iron, copper, lead, and other minerals, and the sum is still but a fourth of the receipts of the railroads. Include the millions of tons of coal, the building stone, petroleum, gas, and every other product extracted from the earth, and the aggregate falls short by half. Now add the values to the farmers of all the wheat, rye, oats, barley, potatoes, and tobacco produced by the entire nation, and the sum would still fail to equal the tolls collected by the railroads each year.

Of this immense sum, more than seven hundred millions goes for wages, supplies, repairs, and other necessary running expenses, leaving a round half billion to be applied on capital. So enormous, however, is the investment, that, save in a few favored instances, the returns are exceedingly meagre. Some $240,000,000 is absorbed in interest on the bonds, yet nearly $1,000,000,000 of these securities receives no return for its use. Dividends on stock reach $164,000,000. But about $4,000,000,000 of the stock, or seventy dollars in every hundred, is passed by in the distribution. Little wonder, therefore, that during the last twenty five years more than 500 companies have failed to meet their obligations and have gone into the hands of receivers. The combined length of these bankrupt roads is 100,000 miles, or more than half the present mileage. Their stocks and bonds aggregated five and a half billions, which is about one half the entire issue of railroad securities. Of this no less than 29,000 miles, representing one and three quarters billions of values, went under during the single panic year of 1893. How much of this wealth has been lost in the wreckage or wiped out through the various schemes of reorganization is best known to the unfortunate holders. Certain it is that these losses in the aggregate must reach hundreds of millions.

An interesting feature of railroad travel is the element of personal safety. With myriads of opportunities for men to blunder and for steel to fail, the wonder is that accidents are so few. Each of the 2,000 passenger trains moving night and day has from forty to a hundred or more wheels, while the wheels on one of the 4,000 constantly moving freight trains may number 500. These wheels strike 300,000,000,000 rails during the twelve months. Yet scarcely fifty wheels and a hundred rails give way so far as to cause a recorded train accident in the course of the year. On the average a person would travel 4,500,000 miles before being injured, and 72,000,000 miles before being killed. Traveling night and day year after year the passenger would sustain his first injury at the end of twenty five years, and meet his death by train accident at the end of four centuries.

Comparatively safe as is the traveler, no such assurance belongs to the man who holds his life in custody. The railroads of the country, on the average, kill four employees a day, and cripple and maim eighty two. Of the men directly concerned with the moving trains, one in every ten is injured during the year, and one in each 150 meets his death.

Next to the general officers the engineer receives the highest pay; but unless he has nerves of steel his life can scarcely be a happy one. Besides the scores of passengers whose safety may depend upon the quickness of his eye and hand, he has under his charge a train whose value may easily be $100,000—more than he could earn in a lifetime. A wrong reading of a signal, a mistake in an order, and two of these palatial trains may crash together, involving the company in an instant in perhaps $500,000 of damages. For besides the valuable rolling stock, there are the passengers, whose injuries have a commercial value in a court of law.

The service performed by these highways in moving goods is difficult to appreciate. The work done in a single year is equal to the transporting of one ton of freight 100,000,000,000 miles, or from ocean to ocean every second of the twenty four hours. To accomplish this in the old way, by wagons, would require twice as many horses as are to-day in the entire country, and at a cost equal to twice the present annual wealth production of the nation. With the aid of the railroads one man's daily work on the average transports a ton of goods 500 miles. A man with two horses probably could not accomplish the same result in a month. On tracks as level and smooth as those provided by the leading trunk lines, one two-inch cube of coal weighing a pound will furnish power sufficient to move a ton of goods with its share of the train two miles along its journey.

A half century ago the canvas top wagon was the pioneer of American civilization. But just in the nick of time came the railroads. These have built up the broad empire of the west until our nation stands first in wealth, first in industrial progress, and is rapidly taking the lead in the commerce of the world. Not yet have these thoroughfares approached the natural limit of their development. When the states of the south and west shall have become as well supplied as those of the northeast, the mileage will increase threefold, and the business swell to some seven or more times its present proportions. That time can come only when, developed by these same railroads, the nation will have a population numbered by the hundreds of millions, and when Denver and San Francisco rival in size the Chicago and New York of to-day.

THE DEVELOPMENT OF AMERICAN RAILWAYS.

BY. STUYVESANT FISH.

[Stuyvesant Fish, president of the Illinois Central railroad; he was born June 24, 1851, in New York, and was educated in Columbia college; he became a clerk in the New York office of the Illinois Central railroad in 1871 and the following year was made secretary to the president; in 1876 he became director of the same road, and treasurer and agent for the purchasing commission of the New Orleans, Jackson and Great Northern railroad; in 1877 he became secretary and in 1882 vice-president of the Chicago, St. Louis and New Orleans railroad; in 1883 he was elected second vice-president and the following year vice-president of the Illinois Central system, and since 1887 he has been president of the same system.]

As was said at the fifth session of the international railway congress by the present king of England, at that time the Prince of Wales, "Great Britain was the birthplace of railways," and "the first railway constructed under parliamentary powers by money publicly subscribed, was inaugurated for passenger traffic between Manchester and Liverpool in 1830."

In 1829 the directors of the Liverpool & Manchester railway offered a prize of £500 sterling for a locomotive that would best conform to certain specified conditions, which required each engine to have two safety valves set for a pressure of not exceeding 50 pounds to the square inch and to run over a level track one mile and three quarters in length, backward and forward ten times, in order to make a total journey of thirty five miles. Three engines competed—the Rocket, built by Robert Stephenson at Newcastle; the Sanspareil, built by Timothy Hackworth at Darlington, and the Novelty, built by Braithwaite & Ericsson in London. The trial took place at Rainhill, near Liverpool. The Rocket proved the most successful, and to it was awarded the prize.

This piece of ancient and well known history is referred to because it was my good fortune to meet some years ago in London Mr. John B. Willcox, who had then been for many years a stockholder of the company in whose service I have been brought up. Mr. Willcox told me that he had taken part in the trial at Rainhill in 1829 as assistant to Stephenson, and said:

"We properly received the prize, as the 'Rocket' conformed more nearly than any other to the specifications laid down by the railroad company; but Ericsson, as subsequent practice proved, had built the better engine."

At the time we had this talk Mr. John Ericsson, a native of Sweden, had long been living in New York as a naturalized American citizen, and was known and honored of all men as the designer and builder of the first turreted ironclad, the Monitor. John B. Willcox died in England, September 7, 1893, and John Ericsson died in New York March 8, 1889. Each of these men had taken an active part in the "birth of the railway" and each lived to see the growth to maturity of the railway system of the whole world as it exists to-day.

A less well remembered fact with regard to America's share in the genesis of the locomotive is that Oliver Evans obtained from the state of Maryland on May 21, 1877, a patent for his, the earliest, high pressure double acting engine, which used steam at a higher pressure than 50 pounds to the square inch, and applied it on both sides of the piston. Evans's patent particularly describes the application of his engine to wheeled carriages, which could be used even on common roads. A machine of this sort was built by him for the city of Philadelphia in 1804. As no railroads then existed in this country, it traversed the streets for a distance of a mile and a half until it reached the Schuylkill river, where it was placed on board a boat, to which a wheel had been attached at the stern, and propelled this vessel for a distance of 16 miles. Evans' engine was afterward used by the city of Philadelphia for other purposes. His patent for a high pressure engine antedated the English patent of Trevethick & Vivian, which was issued in March, 1802, by nearly 15 years. Of him a German engineer, Ernest Alban, says:

"To Oliver Evans was it reserved to show the true value of a long known principle, and to establish thereon a new and more simple method of applying the power of steam, a method that will remain an eternal memorial to its introducer."

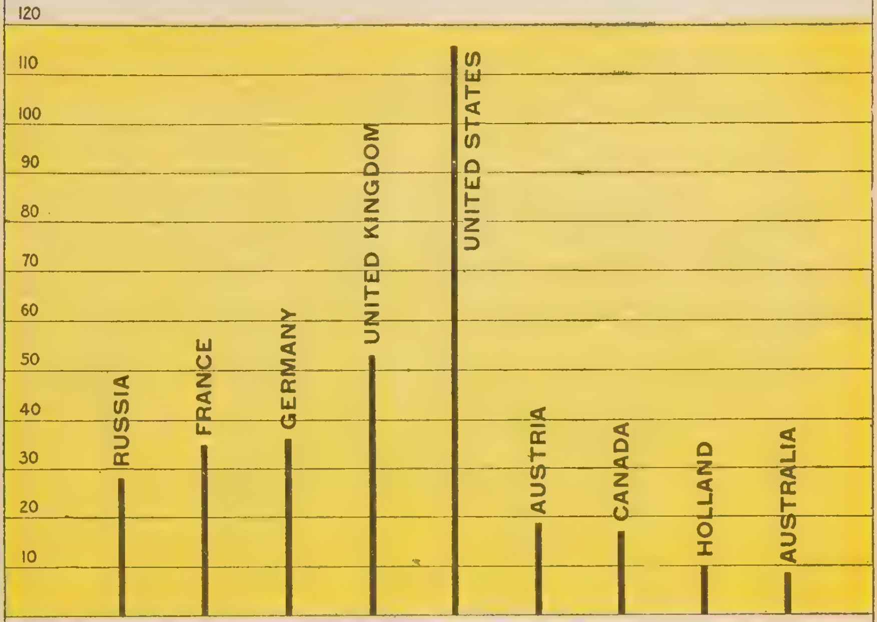
While at the outset there was greater need for railways in America than elsewhere, there was no capital for such enterprises, nor were there shops in which engines could be built or rails rolled as readily or as well as in England. The Baltimore & Ohio railroad, the Delaware & Hudson canal company, to the completion of whose works a few miles of inclined planes were essential, and the South Carolina railroad company, which built the first 100 miles of continuous railway in this or any country, each separately petitioned congress at different dates to remit the duties on iron needed in the construction of their lines, showing that the amount required for rails alone could not be manufactured in this country within the limited time set in their charters for the completion of their works, and congress passed an "act to release from duty iron prepared for and actually laid on railways or inclined planes," which was approved on July 14, 1832, by President Jackson and remained in force for several years.

While it is undoubtedly true that Great Britain was the birthplace of the railway, it is equally true that almost from the beginning the railways received their greatest impulse in this country. For, as a recent French writer, M. Pierre Leroy-Beaulieu, has said in his "Les Etats-Unis au XX Siecle" ("The United States in the Twentieth Century"):

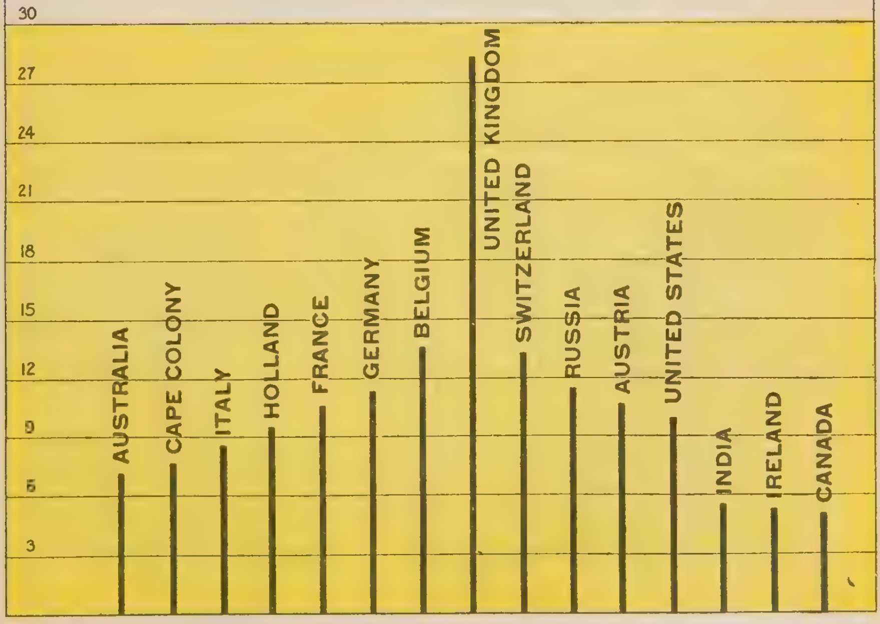
"Great as has been the part played by the railroads, and profound as has been the economic revolution caused by their introduction, their importance has been greater in new countries than anywhere else. In the old countries of western and central Europe, with dense population, they commenced by collecting traffic already active and due to a production already intense. The market facilities they have afforded have enormously increased this traffic and this production. In new countries, in great part uninhabited, much more extended and more rugged than Europe, they have done more. They have created both the traffic and the producton; they have permitted the settlement of lands which without them would not have been cultivated for a long time, because of the impossibility of transporting their products to distant points, and of obtaining from enormous distances many necessities of life which could not be raised in these lands on account of local conditions being unfavorable to them. We may boldly

RAILROADS OF THE WORLD

AMOUNT OF CAPITAL IN HUNDREDS OF MILLIONS OF DOLLARS



RECEIPTS PER MILE IN THOUSANDS OF DOLLARS



say that without the railroads three quarters of the immense territory of the United States, situated too far from the sea and having insufficient communication by rivers or lakes, would be still almost deserts, and would not play in the economic life of the world a more important part than Siberia did, for instance, before being lifted from her isolation by the trans-Siberian railroad.

"Americans perceived from the very beginning the great importance of railways in the development of their country. As soon as they were put in possession of this marvelous implement they covered their country with it. Since 1850 the United States has been among the first of the nations of the world in the extent of its railways. It has possessed more than France and England put together. It has not ceased to extend them with great rapidity, and since about 1860 it has had at all times more than the whole of Europe."

But this relates to the mere magnitude of our railroad system, and M. Leroy-Beaulieu does not here, as he does elsewhere, go into the question of the permanent way, of the motive power, and of the vehicles nor of the frequency and efficiency of the service rendered. In America the problem was to raise capital sufficient to manage in some way to provide means of transportation where none existed, and very generally to do this in advance of population and through a wilderness, while in Europe the problem was, with an abundance of capital, to merely provide a better and cheaper means of transportation which should supplement the existing excellent highways and canals. The eagerness of our people for means of transportation induced them to put up with a service and to endure conditions which would not for a moment have been tolerated in more densely settled and more highly organized countries, and foreigners will, as they travel through the country, I doubt not, be astonished to see trains operated at grade through the streets of populous towns and cities.

It must be remembered that in 1830 the greater part of this country, practically all that lying westward of the Alleghany mountains, was unsettled and that our population was then rural rather than urban. There was in the United States at that time but one city containing 100,000 inhabitants, and only twenty-two others containing 10,000, while at present there are thirty-nine cities of 100,000 inhabitants or over, including among them three of upwards of a million each, and four hundred other cities and towns of from 10,000 to 100,000 inhabitants. In the ten years from 1890 to 1900 the area of one hundred and twenty-nine of these towns and cities was extended by five hundred and eight square miles. The tracks now lying in the paved streets of incorporated towns and cities were generally laid on what was, at the time of building, open farming land. To take a particular instance, at the time the first section of the Illinois Central railroad was opened for traffic in 1852 the limits of the city of Chicago ended at Twenty-second street. To-day they extend nearly fifteen miles to the southward thereof, through what in 1852 was open prairie land with scarcely a house in sight.

Vast as has been the growth of the railroad system on this side of the Atlantic, we in these newer countries must now look more and more to the experience of Europe for light in dealing with the problems which are beginning to confront us on account of our increasing population and civilization. This will involve a vast expenditure of capital, and it may be that when we shall have met and overcome all these difficulties, the capitalization of our railways, which in the United States is now $63,186 per mile, may approach that of the railways of Great Britain, which is £55,495, or, say $277,475 per mile. While I hardly think we shall go that far, I am certain there must be a very great increase above the figures now prevailing. This because we must now do what they did at the outset—provide second, third and fourth tracks and separate, at least in the densely populated towns and cities, the plane of railway traffic from the plane of street travel. Nor is this by any means the only point on which we look to Europe for enlightenment. The preponderance in the older countries of passenger traffic in its relation to freight traffic presents a condition which is confronting us more and more. Already in our Eastern states the proportion of the revenue derived from the carriage of freight—to-wit, 54 per cent of the total receipts from operation—is as low as in Great Britain, although in the interior and in the west the receipts from freight still form upward of 70 per cent of our total revenues.

Much has been said of late here and abroad about inland transportation by canal. In this connection we must not confuse transportation by steamships on the great lakes, which are inland seas on which ply vessels larger than those that traversed the Atlantic 30 years ago. Apart from these lakes, there are two great inland waterways in the United States —the Mississippi river and the Erie canal.

It is within my knowledge that 20 years ago there were annually carried by steamboats from Memphis to New Orleans over 100,000 bales of cotton, and that in almost every year since the railroads between Memphis and New Orleans passed under one management, not a single bale has been carried down the Mississippi river from Memphis by boat, and in no one year have 500 bales been thus carried. The reason being that, including the charges for marine and fire insurance, the rates by water are higher than by rail.

Moreover, in 1890 the tonnage of freight received and delivered at New Orleans by the Mississippi river from all sources amounted to 2,306,290 tons, and in 1900 to 450,498 tons; while the receipts and shipments by rail were in 1890, 3,557,742 tons, and in 1900, 6,852,064 tons.

In 1860 there were carried on the New York canals and on the railroads competing therewith 7,155,803 tons, of which there was handled by canal 65 per cent. In 1870 such tonnage amounted to 17,488,469, of which 35 per cent was handled by canal. In 1880 the total tonnage was 29,943,633, of which by canal 21 per cent. The tonnage for 1890 was 56,327,661, the canal's proportion being nine and three-tenths per cent. In 1900 the tonnage was 84,942,988, of which the canals carried four and one-tenth per cent. In 1903 the total tonnage had grown to 93,248,299 tons, of which the canals carried but three and nine-tenths per cent. Indeed, the amount carried in 1903 by all the canals of New York state, including the Erie canal, 3,615,381 tons, was less than four-fifths of the 4,650,214 tons carried in 1860.

For many years past the function of these and other inland waterways has been rather to act as a check upon the railways in reducing their rates, than in and of themselves to carry any great proportion of the total or any increased tonnage.

With regard to the service actually rendered by the American railways to the public, it is difficult to get accurate figures for the years prior to 1889. In that year the railways of the United kingdom of Great Britain and Ireland carried of passengers, exclusive of season or periodical ticket holders. 775,183,073
and in 1903. 1,195,265,195

The increase, therefore, was 54.2 per cent, or . 420,082,122
In the year 1889 the railways of the United States carried of passengers. 472,171,343
and in 1903. 694,891,535

An increase of 47.2 per cent or. 222,720,192

Not only is the number of passengers carried much greater in Great Britain than in this country, but it has increased more rapidly there than here. This is in some measure due to the introduction of electric traction trolley lines in the United States.

But with regard to freight the conditions are reversed.
In Great Britain there were carried in 1889 297,494,513 tons
and in 1903. . . . . 443,697,947 tons

Increase . . . . .49.2 per cent or 146,203,434 tons
In the United States in 1889. . . . . 539,639,583 tons
and in 1903 . . . . 1,304,394,323 tons

Increase . . . . .141.7 per cent or 764,754,740 tons

Not only is the volume of freight carried in the United States so much greater, but the ratio of increase has with us been almost three times as great. The average distance traveled by each passenger in the United States is four times as great as in Great Britain, and the distance which a ton of freight is carried is many times as great, and increasingly so.

The British reports fail to show the real measure of the service performed, viz., the number of passengers carried one mile, and of tons of freight carried one mile; but with us those figures are accessible.

The number of passengers carried one mile in the United States was:

In 1889	11,553,820,445
In 1903	20,915,763,881
Increase .81 per cent or	9,361,943,436
The tons carried one mile in 1889 were	68,727,223,146
In 1903	173,221,278,993
Increase .152 per cent or	104,494,055,847

Now, adding the passengers carried one mile and the tons of freight carried one mile together, to show the units of service rendered by the railways to the public, we get the following figures:

In 1889	80,281,043,591
In 1903	194,137,042,874
Increase .141.8 per cent or	113,855,999,283

Some of this was undoubtedly due to the increase in the number of miles of railroad operated, which were:

In 1889	153,385
In 1903	205,313
Increase .33.9 per cent or	51,928

That this service was rendered at low and diminishing rates is demonstrated by the growth of the tonnage and the growth of the country in population, in manufactures and in wealth.

The gross receipts of the American railways from all sources, including rents, sales of lands, interest on investments, etc., were:

In 1889	$1,089,985,831
In 1903	1,950,743,636
Increase .78.6 per cent, or	860,757,805

That is to say, in the United States the ratio of increase in gross receipts from all sources has been less than that of the number of passengers carried one mile; but little more than half of the ratio of increase in the number of tons carried one mile, and less than nine-sixteenths of the ratio of increase in units of service rendered.

As M. Leroy-Beaulieu has said, the American railways have created both the traffic and the production. The earliest explorers of the Mississippi valley, the French Jesuit priests, commented constantly upon the fertility of the soil. Their maps, made as early as 1673, showed coal (charbon de terre) as outcropping along the banks of the Illinois river. But it was not until the railways made "commerce among the several states" possible that our prairies became a fit abode for man, or the mineral and forest wealth of the west became available to man. Without the railway those prairies would yet be the abode of the Indian and the bison. For while the earliest settlements of English-speaking people on our Atlantic seaboard were made in Virginia in 1607, civilization had not in 1850, except in scattering settlements along the banks of rivers naturally navigable, reached one-third of the distance across the continent. The reports of the engineers sent out in 1852 to make the original surveys for the construction of the Illinois Central railroad across the prairies of Illinois refer to their camps being constantly invaded by wolves. In short, without railways, civilization consumed 250 years in moving less than 1,000 miles inland, while in the 50 years which have since elapsed we have seen it pass, aided and led by the railway, on through arid wastes and over the great chains of mountains which form the backbone of the continent, until today there is no portion of the wide stretch of 3,000 miles, from the Atlantic to the Pacific, which is without means of rapid and convenient transportation.

What has been and is being done by the American railways is admirably summed up by two recent foreign writers.

Mr. Neville Priestly, under secretary to the government of India, railway department, in the conclusion of his report on the organization and workings of railways in America, says:

"Many of the methods are different, often startlingly different, from those one has been brought up to believe the only correct method; and it is not till one realizes that the one idea in the mind of the American railway men is to 'get there,' and that they do 'get there' by the shortest and quickest way, and do not allow themselves to be turned aside either by red tape, old-time prejudices, tradition, or any other of the bogeys by which older countries are assailed, that one understands how the results have been obtained which one sees there. American railway men are quick to see a new idea; they are quicker still to try it; they take a great pride in their profession, and are all striving to get at the science of it. That their methods are not always perfect is what might have been expected; but they have managed to do what no other country in the world has done, and that is, carry their goods traffic profitably at extraordinarly low rates notwithstanding the fact that they pay more for their labor than any other country."

In like manner M. Pierre Leroy-Beaulieu, at the end of his chapter on railways, says:

"In looking for models of railway management it is in the direction of American freedom that we must turn, rather than to the respective methods of operation by the state."

THE SOCIAL AND ECONOMIC EFFECTS OF RAILROADS.

BY CHARLES BARNARD.

[Charles Barnard, author and dramatist; he was born Feb. 13, 1838, at Boston; he has been editor of a number of publications, contributes to leading reviews and is the author of Knights of To-day, Co-operation as a Business, The Tone Masters, The Soprano, My Ten-Rod Farm, Tools and Machines, Light, in co-operation with the late Prof. Meyer, The County Fair and other plays.]

There are two ways in which the value of a lifetime may be measured. It can be measured by years or by events. A man may live to be eighty years old and yet find at the end that his life was hardly worth living. A Mozart may die at thirty-five and measure his life by the birth of great compositions, each an event in the musical history of the world. One woman may spend long quiet years upon a farm with only the few great days of every woman's life, birth, marriage, motherhood, and death. Another may, before she is twenty, see all the great cities of Europe and America, meet many notable people, write a book, or take part in artistic life, and at twenty-five be older in experience than many a rural housewife at seventy-five. Years do not count. A man lives by events.

Nations and people have their lives, and the life of a nation may also be counted by years or by experience. During the so-called Dark Ages all the nations of Europe were practically at a complete standstill. The earth, indeed, measured the time into days, years, and centuries, yet there was no progress, because nothing happened. More events in national lives came in the seventeenth century than in the five hundred years that went before. More important events have filled the ninety years of this century than in all the Christian era. We live in eventful years to-day. We experience more in a year than our forefathers in all their lives. To see how different life is to-day from life in the last century we have only to notice the difference in the simple matter of getting about. When Washington was president it took four days to go from New York to Boston. Now a physician in New York, having occasion to visit a patient in Boston, may leave his home at half past eight o'clock, spend twenty minutes by his patient's bedside, and be back to his office in New York again at half past seven the same evening. A hundred years ago every man lived near his business, the merchant over his store, the mechanic close beside his shop. There are to-day a hundred thousand people doing business in New York who go from five to twenty miles to find supper and bed. Then only the few traveled and a man saw only the faces of his kindred and his neighbors. To-day it is not uncommon to find families having relatives in many states, and yet seeing each other often.

This freedom to move about quickly and cheaply has produced remarkable mental and even moral changes. Visiting new places and seeing strange faces stimulate and quicken the mind. New sensations, new ideas, new experience, stir new thoughts. New problems of life, manners, business, and morals arise. We are called upon to decide new questions and to decide them quickly. The merchant of fifty years ago received a long letter. He must duly consider it, talk it over, consult his wife, or sleep on it. The merchant to-day decides in five minutes and sets in motion whole trains loaded with freight while his grandfather would be considering the propriety of hiring another horse. All this means that we must think faster, decide more promptly, and in every way accomplish more in a given time.

Once the town population lived in town, the rural people were far from cities. To-day a large part of the people in every city have their homes in the country at a very great gain in mental and moral health. The vices of the city wither away in the suburban towns. On the other hand, the stupidity and narrowness of country life is quickened by frequent contact with city life. The old adage that "a rolling stone gathers no moss," has lost its meaning. "A rolling stone gets a fine polish," and that's better than the moss of inaction.

This mental activity that has sprung from the modern freedom to move about, is not wholly an advantage. We experience more in a year and so far it is a gain, but experience costs. The eye is wearied by a quick succession of changing views, the ear may be dulled by too much music. In like manner the mind may be wearied by too many impressions and mental activity may quickly rise through excitement into insanity. To-day we read almost without comment of business men suddenly dropping dead in the street before half their days are told. The railroad has compelled us all to live fast. The pace of the locomotive kills. Everywhere we see among our people an alarming increase of serious diseases. People become anxious, irritable, nervous, and hurried. Something snaps, and the end comes quickly. As an evidence that this intensity of experience is harmful, we may notice the rapidly shortening hours of labor, the increase of holidays, the lengthening of vacations, and the disposition among city people to spend more and more time in the country during the summer. All these are defenses against the wear and tear of city life—why?—because people and things can be moved so fast that all business moves faster and faster and for such a killing pace we must have the relief of more rest and longer vacations.

The railroad has in all these directions changed our social and business life so that we lead wholly different lives from all the men who have gone before. On the other hand, it has been of very great mental benefit. It is said that insanity was at one time very common among farmers. The dullness and stupidity of their lives drove them into mental collapse. The railroad now brings the town to the farm, the city paper comes to the rural fireside, and trips to town are cheap and easy. The appalling monotony of country life is quickened by the rush of the train through the quiet valleys, and life seems more worth living, because more interesting.

Balancing one thing against another we must conclude that there is a gain in all this. We must remember that only two generations have had the railroad, while thousands of generations got along very well without it. It takes time to bring people to new experiences, to train them to the new methods of doing business, to the changed conditions of social and domestic life. The wonder is not so much that so many are injured by the speed of modern life, but that so few fail to adjust themselves to these railroad times. Viewed from the highest standpoint, life is far more worth living to-day than ever before, because we can experience more. Doing less work in a year, having more leisure, free to move about and gain the splendid education of travel, we may well congratulate ourselves that our lives have fallen on such active days. Life is worth more to-day, because of the locomotive. It depends upon ourselves how much more it is worth.

Every man must have three things before he can accomplish anything worth the doing. He must have a roof, have raiment, and regular meals. The prices of food, clothes, and shelter are thus the prime factors in every man's business. Up to the early part of this century, houses were built of the materials nearest at hand. Wooden houses in Norway and Switzerland, stone houses in England, brick houses in clay countries. Our fathers built almost wholly of wood because this was a timber country. Woolen and linen were almost the only materials for garments in Europe up to the sixteenth century, because there was no means of bringing silk from China. Flax and sheep were raised on the farm and the farm clothed the people in both town and country. There was good bread and meat with vegetables and a little fruit for those who could afford to pay for it. All these, houses, clothes, and food, were the products of the land in the immediate neighborhood and all were expensive. The vast majority of the people, previous to this century, did no more than earn enough to meet these three wants, and only the very few had much more.

The contrast between the last century and this is remarkable. We build in brick, stone, marble, iron, or wood as we wish, because these things can be transported to our building site from a distance. Marble is cheap in Vermont and yet we find it common everywhere. Clay is abundant in New Jersey and New York city is built of brick. Black walnut is scattered over the western states and yet it forms part of the interior of every New England house, and the floors of half the houses in the northern states are covered with southern pine.

Homespun was the only wear in the revolution. To-day our store windows are museums of fabrics. Silk, cotton, jute, alpaca, and wool come from our looms in every variety of combination, because our manufacturers can draw from all climates the best materials they offer. Transportation has brought the clothing of every people to our counters and we have our choice of the raiment once confined to single nations. The old Egyptian had his cotton, the Chinaman his silks, the dweller in Arabia his woolen, and the early Irishman his linen. We have all and at a far less price and in better quality.

The history of the world is chiefly the story of disasters. The historians seemed to think that all that was worth recording had to do with the misery and suffering of the people or the exploits of kings, which always meant wretchedness for the people. Wars, plagues, and famines were frequent and made the great events of history. The people were fed from the soil on which they had lived and the failure of their crops meant both famine and the diseases that spring from bad or insufficient food. People starved in France while wheat rotted in the fields of Russia. England might be short of beef and cattle abundant in Germany. In the dense populations of India and China, famines have been frequent down to recent years, because of the difficulty of moving food over a few hundred miles. During the revolution the colonies raised all their own food. To-day there is not enough Indian corn raised in Massachusetts to give every man, woman, and child one good corn cake once a year. The New England states do not produce their own bread, beef, strawberries, or salt and yet the people there seem pretty hearty, as if they lived well and enjoyed all the goodly fruits of the earth. It is said that in Connecticut one man by the labor of his hands can earn enough in one week to pay for all the wheat he can eat in one year, and that one day's labor will pay for transporting that wheat in the form of flour from Minneapolis to New Haven. The railroads have made food so cheap that we have changed from a nation of producers to a nation half producers and half non-producers. Famines cannot appear on this continent, they will probably never reappear in any civilized country. It is difficult to estimate what this means, difficult to count up the enormous gain to humanity to be free forever from the fear of general starvation. Plagues, too, have probably gone, never to return, because a failure of the crops in one part of the world can be met by supplies from another part, and when all the people are well fed, well clothed, and fully sheltered the universal health improves and the terrible epidemics of the past disappear. These great gains we owe almost wholly to our steamships and railroads.

Looking at the matter from a personal standpoint we see that life is easier because these three basic wants are now so easily supplied. While house rents may be higher than one hundred years ago, we can get a great deal more for our money. We can get a warmer and better house with more conveniences and in a sanitary sense a safer house and in an artistic sense a far more beautiful house than could be commonly secured by our grandfathers. There were indeed a few beautiful colonial houses in the early days, but the homes of the majority were uncomfortable, unsanitary, and unlovely.

In the matter of food and clothes a man can get far more for his money than ever his grandfather could and life is just so much easier. The railroads have thus helped every man by enabling him to get these things quickly and for little money. The margin of profit is thus raised and a man can save more time and more money than ever before. If for any reason the railroads were closed and all transportation was at a standstill, famine would appear in our streets and no man could hope to do more than earn a bare living—and a pretty poor living at that.

Up to the year 1836 the records of the United States post office department do not mention any method of transporting the mails except stages, sulkies, post coaches, horseback, and steamboats. Even the steamboats were new and the larger part of the mail bags were sent by horse along such roads as we had, and they were bad at best. To-day we are impatient if the postman is a few minutes late with our morning mail. Think what it might be to get a letter from a distant friend, say in Portland, Maine, while we are in Baltimore, a letter a week old and telling us to hasten to the bedside of a dear friend, a mother, perhaps. The suspense and uncertainty would be dreadful. It might be our friend had fallen asleep by this time. Another week must pass before we could reach this bedside. The distance between the two towns would seem immense, our isolation from those we hold dear, complete. Yet this was the common experience previous to 1825 when steamboats begun in a little way to hasten the mails. They came as early as 1811, but it took us ten years to build the first fifty steamboats. Our fathers were a patient people. It would seem to us almost insupportable to wait a week for a letter that might mean life or death. To-day the mail train would take that same letter from Maryland to Maine in twenty-four hours. How great the gain is simply beyond words to tell, because when the heart waits, the moments seem like hours and the hours are long days.

In social life, in business, even in our pleasures the fast mail train has doubled and trebled the value of time. Letters are often the way marks of experience and the railroad has widened all our lives by bringing us new experiences, by placing us in more frequent contact with other hearts and minds. Moreover, the newspaper correspondent brings us close to the experiences of other and distant peoples. His vivid letters are laid on our tables by fast mail and we see every day, even in the quiet of the country, a picture of all the world. Thus our sympathies are widened and our outlook broadened till we see that all the world are kin.

In 1830 we built in this country, the first twenty-three miles of railroad. The new roads were an experiment. Many objections were raised against them and capital was too timid to venture into them. By 1835 we had built 1,098 miles of new track. The idea had taken hold on the popular mind, and roads began to extend rapidly over the country. Five years later, however, we had built only 2,818 miles, showing that there was still some hesitation in the matter of sinking money in the new roads. In 1845 we had 4,633 miles, and in 1850 we had 9,621 miles. The next ten years saw a rapid advance, and in 1860 we had 30,635 miles. Through the war and immediately after, the roads increased rapidly and by 1870 we had 52,914 miles. In 1880 we increased our roads to 93,349 miles, and in 1903 had 207,604 miles of track. In this wonderful advance there were quite as wonderful changes in the entire business of the country. Not only were millions of money invested in the new roads, but all arts, trades, manufactures, and commerce eagerly accepted the new methods of handling people and things and advanced upon a new and wonderful progress, the end of which we cannot even guess or measure.

New trades, new industries, new systems of doing business appeared. Even retail stores sprang into a wholly new kind of trade, and in place of supplying neighborhoods, sought to supply counties and states. The great express business grew out of the railroads, and in place of the traveling salesman, peddling goods over the country, the rural buyer orders by fast mail and selects by sample the goods she wants delivered by express. Out of the railroad has sprung the great fruit trade of to-day, and strawberries are plenty for three months every year in all the northern cities. The kitchen gardener once doled out his lettuce to the neighbors. To-day Boston lettuce and Newport roses are sold fresh every day in New York, and you can buy Boston brown bread every afternoon on Broadway, fresh that morning from the ovens at the Hub.

December 1, 1902, we had built 206,885 miles of railroad. This vast extent of road was valued at $14,862,111,544. In 1903 these railroads carried 696,949,925 passengers. They moved 1,306,628,858 tons of freight, and from freight, passenger and miscellaneous earnings received $1,908,857,826. The cost of operating the roads was $1,316,349,314, and there was left $592,508,512 to be divided among the stockholders.

It is difficult to justly estimate the effect of this immense interest on all other interests. It supplies a vast field of labor directly in the care and maintenance of the roads and indirectly in creating other industries, rail making, car building, coal mining, and countless small manufactures of railroad supplies. With an eagerness that is marvelous, all commercial interests accepted the railroad as a benefit that could not be reckoned in money and that, while it changed all the methods of doing business, must for a long time to come steadily improve these very methods by making the work quicker, easier, and safer. Thus we see all the world, social, domestic, industrial, political, and commercial, changed in two generations from the old to the new, from the stage coach to the locomotive, and all this almost without jar or confusion, or serious commercial disaster. Whether we have reached the end of the changes or not, whether we have reached the limit of the speed or even usefulness of the locomotive, remains to be seen. One thing, however, seems to be clear; the great changes caused by the introduction of the railroads have been accomplished in comparative ease and safety and we are now securely adjusted to the changed relations that sprang from the advent of the locomotive and steamboat.

THE NATION'S DEBT TO RAILROADS.

BY JAMES J. HILL.

[James J. Hill, capitalist and railroad official; he was born Sept. 16, 1838, near Guelph, Ontario; he was educated at Rockwood academy, and from 1856 to 1865 was in the steamboat offices of St. Paul, Minn.; in 1865 he was agent for the Northwestern Packet company and afterward founded a transportation and fuel business of his own; in 1869 being president of the Hill, Griggs & Company, and in 1870 establishing the Red River Transportation company, which opened the first communication between Winnipeg and St. Paul; in 1873 he organized a syndicate which gained control from Dutch owners of the securities of the St. Paul & Pacific railroad and re-organized it as the Minneapolis & Manitoba railroad; he was general manager for this system 1879–82, when he became vice-president, and, since 1883, president; he then interested himself in extending the Great Northern system, of which his system became part in 1890; it was through his endeavors that the Great Northern railway was extended from Lake Superior to Puget sound and given direct steamship connection with China and Japan, in addition to its northern and southern railroad branches; since 1893 he has been president of the Great Northern system; he was also chief promoter and now president of the Northern Securities company.]

Commerce is the exchange of commodities, and the term is generally understood to include the buying and selling between individuals, and, in a wider sense, between communities and nations. Behind its adventurous leadership have followed civilization and Christianity to the remotest parts of the world. The commercial nations of the world have, at all times, exercised the strongest influence for good among the nations of the earth.

The development of commerce is the effort by a country to find a market for its own productions, or to supply itself with material for its necessities, or to further increase its means of commercial expansion. The commercial expansion of a nation is the best index of its growth. Commercial growth is both domestic and foreign.

Following the civil war came a period in the history of our country of internal development, which has been the wonder of the world. Since the close of the war in 1865, the enormous territory west of the Mississippi has grown from frontier settlements into great, populous and wealthy states.

The population of the United States in 1865 was about 34,000,000. The succeeding thirty-five years ending in 1900 carried it to 76,000,000 and to-day we are increasing at the rate of a million and a half a year. The various census reports show that the population of the United States about doubles every thirty years, so that by 1930 we would, at this ratio, have a population of 150,000,000 people.

In the past the public domain suited to cultivation of the soil, producing every useful crop, has furnished homes for the multiplying population. To-day we have about reached the limit of our public domain which can be made to furnish homes for an intelligent and enterprising population.

In many of the western states are enormous areas of the best land which, with irrigation, can be made productive in the highest degree. One hundred and sixty acres of land, with a certain supply of water, which will insure to the husbandman a bountiful harvest, is equal to twice that area where the land is subject to the natural conditions of either too much or too little rainfall.

One-half of the population of the United States is occupied directly or indirectly in the cultivation of the land, and I think fully one-half of the entire capital of the country is invested in farms and their belongings, and when we come to the questions of intelligence, patriotism and good citizenship, the agricultural population stands out to-day as it has in the past, as the great sheet anchor of the nation.

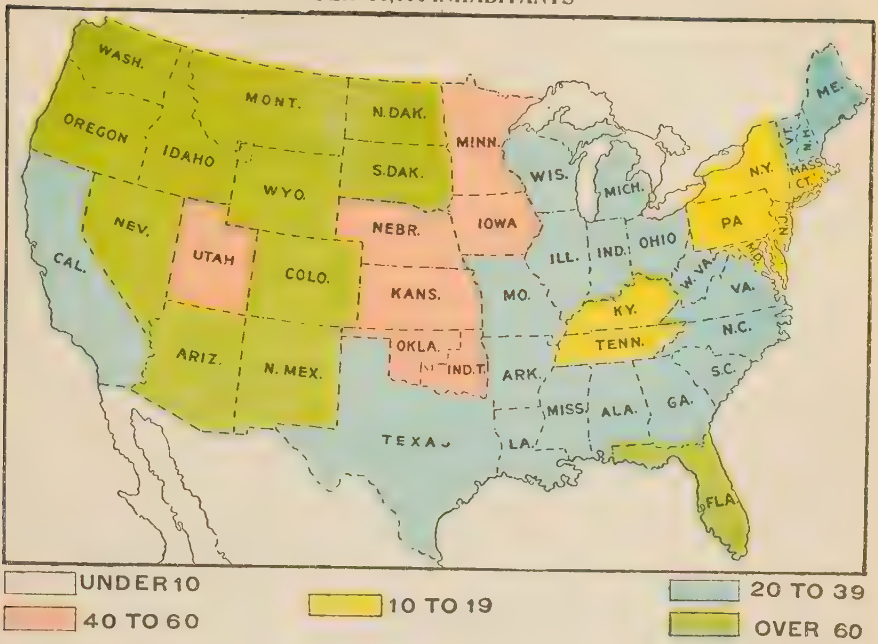
The wealth of the world comes from the farm, the forest, the mine and the sea. While our country has been blessed with wonderful mines of coal, iron, gold, silver and all the other valuable mineral productions, with magnificent forests of useful timber, still the farm has, from the beginning, been the foundation of our growing wealth and greatness.

During the recent years the balance of our trade with other nations, that is the amount we have sold in excess of what we have bought, has averaged about $700,000,000 annually and two-thirds of this has come to us through the export of the produce of the soil.

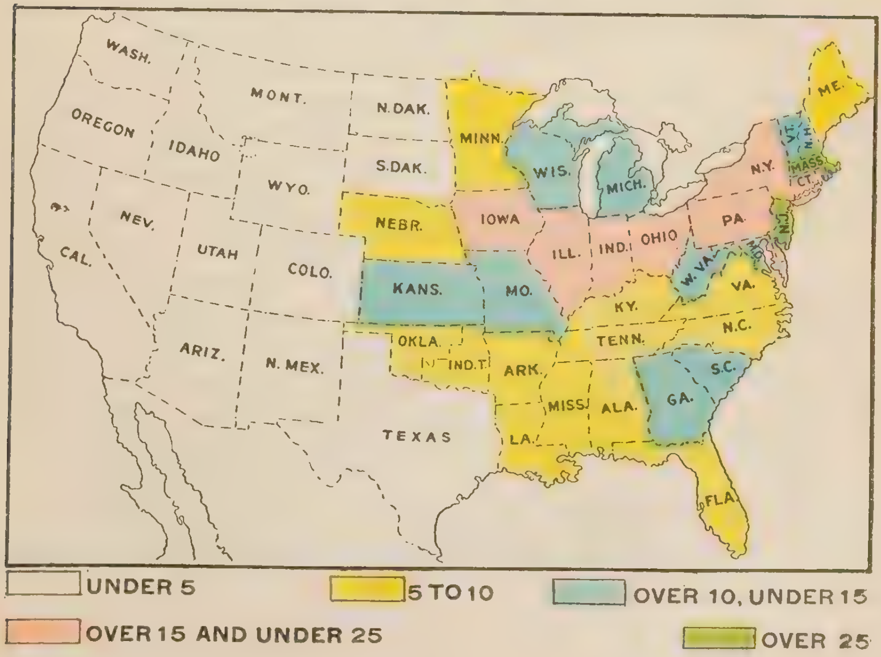
I do not wish in any manner to belittle the importance of our growing manufactures or their relative value in the commerce of the country. The security of their foundations has always rested upon the agricultural growth of the nation and in the future it must continue to rest there. Every

MILEAGE OF RAILWAYS

PER 10,000 INHABITANTS



PER 100 SQUARE MILES



manufacturer, every merchant, every business man throughout the land, is most deeply interested in maintaining the growth and development of our agricultural resources.

In the past we have been in the habit of feeling that "Uncle Sam was rich enough to give us all a farm," but, to-day, as stated before, the arable land suitable for agriculture without an artificial supply of moisture is practically all occupied.

In a few limited communities of the west irrigation has been commenced by what may be called "individual effort." Owing to diverse laws, made to suit particular interests, the irrigation of large areas is attended by greater difficulties than can be well surmounted by individual effort.

For the first time in the history of this country, thousands of our farmers from states like Iowa, Kansas, Missouri, Michigan, Wisconsin and Minnesota are seeking homes in the Canadian northwest owing to the cheap lands offered in that country, and to the difficulty of securing such lands in the United States.

A wise system of irrigation by the general government can be made not only self-sustaining but a source of income. Lands, that without irrigation are given away or sold at a nominal price, can be sold as fast as they are furnished with water, at $10 an acre or upward, and the cost would be little, if anything, more than half that sum.

I cannot urge too strongly on the part of every man who wishes his country well, and who desires that all shall be prosperous, in order that he himself may be prosperous with them, the importance and the growing necessity of taking care of our public domain in such a way as to preserve it for generations now unborn.

The United States has many social questions to settle in the near future and nothing in this connection will take the place of its ability to provide good homes for those who desire to sit under their own vine and fig tree.

Land without population is a wilderness and population without land is a mob.

Considering the question from a broad national standpoint, the next interest in importance to agriculture is the railway interest of the country. The entire railway growth is within the memory of men living.

Twenty-five years ago it was not supposed possible that railways would ever be able to carry heavy and cheap commodities, which were up to that time almost exclusively shipped by water. Great elevators were built in Chicago, Milwaukee and other lake ports, to hold the grain for the season of open water, in order that it might move to market at a fair rate.

Early builders of railways never realized the service to be rendered to the country by the railways. I think I am safe in saying that next to the Christian religion and the common schools no other single work enters into the welfare and happiness of the people of the whole country to the same extent as the railway; no other work could have made it possible to occupy the enormous stretches through the interior of our country and people them with cities, towns and villages.

While the railways have to answer for many mistakes of judgment, or of intent, on the whole the result has been to create the most effective, useful, and, by far, the cheapest system of land transportation in the world.

In England the average amount paid by the shipper for moving a ton of freight 100 miles is $2.35; in France, $2.10; in Austria, $1.90; in Germany, where most of the railways are owned and operated by the government, $1.84; in Russia, also government ownership, where the shipments are carried under conditions more similar to our own than in any other country as respects long haul, $1.70; in the United States the average cost is $0.73, or less than 40 per cent of the average cost in Europe.

And this is done while every article used by the railroads, including labor, costs more in this country than it costs in Europe with the exception of coal and right of way. Wages in the United States are, as a rule, more than twice as high, and this high cost in the United States is constantly increasing; but, notwithstanding the enormous advance in wages, in material of every kind, the rates of transportation in the United States have gone steadily down from year to year, until they are by comparison so much lower than those of any other country that there is no comparison between them.

If these results have been accomplished under all the changing conditions of financial prosperity and adversity in the past thirty years, have we not, as a nation, reason to rejoice in what has been accomplished rather than to seek to destroy or appropriate the means which have brought about these results?

When we consider what has been accomplished by the railway companies in the past thirty years, the singularly low rate of transportation which prevails, the average cost being not to exceed one-third of what it was thirty years ago, the reduction of freight classifications from fifty or more to three, the increase by thousands of through routes and rates, the improvement of facilities for transportation in roadway, equipment, and terminals, has not the country abundant reason to congratulate itself on what has been accomplished?

All this has been brought about by the railway companies in their efforts to serve the public and help themselves rather than by any legislative or other interference. The railways of the country are subject to the interstate commerce law. It is said that carriers do not observe the law; that rates are unreasonable; that the public are oppressed.

To remedy the evils, growing, as is claimed, out of the violation of the law, government ownership is suggested by some, and an increase of the power of the interstate commerce commission by others. Government ownership means the control and operation of railways by government officials. A mere statement of the proposition arouses in the mind of almost every thoughtful man the fear that such power would end in the destruction of the government itself.

Aside from all economic questions and the increased cost to the public, either in direct advance of rates or indirect cost of increased taxation, it would mean the political appointment of an additional million of public officials and the exercise of a power, sufficient to imperil, if not to destroy, free government in the United States.

Upon the question of the power of the interstate commerce commission, as respects rates and railway operation, I believe that all public service should be regulated by fair and reasonable laws. The interstate commerce law declares the common law and prohibits extortion and unjust discrimination between persons and places

It provides, as does the common law, that all charges made for any service rendered or to be rendered in the transportation of passengers or property shall be reasonable and just. Every unreasonable and unjust charge is declared to be unlawful.

All rates of transportation must be published, and when published it is made unlawful for any carrier to charge or receive a greater or less compensation than that specified in the schedule of published rates at the time in force. To charge a higher or lower rate than that fixed by the schedule at the time in force is in violation of law, and a carrier who violates the law, if not subject to criminal prosecution, is subject to complaint of violation to be made to the commission and to suit in court for the purpose of recovering damages or seeking reparation for the wrong done.

The act of charging a higher or lower rate than that specified in the schedule at the time in force is unlawful. Unlawful acts may be restrained or punished and those injured thereby have redress for the injury.

Under the provisions of the act carriers are liable to persons injured to pay full damages sustained in consequence of a violation of the act, together with reasonable attorney's fees to be fixed by the court. Shippers claiming to have been damaged by any act of a carrier subject to the law may, instead of bringing suit in court to be prosecuted at their own risk and expense, make complaint to the commission in an informal way, by a letter mailed with a two-cent stamp.

If a published rate is unreasonable it is unlawful. Any shipper claiming to have sustained damage by reason of the enforcement of the rate may make complaint to the commission, and it then becomes the duty of the commission, at the expense of the government and without cost to the complainant, to investigate the complaint.

All the powers of the court are open to the commission to produce evidence, books and papers. It may award damages, fix the measure of reparation, and if its order is not obeyed it may institute proceedings in court at the expense of the government and without cost to the complainant to enforce its order, and in event of recovery the carrier proceeded against must not only pay the cost of the defence, but reasonable attorney's fee for the prosecution.

A party having been injured need not complain to the commission in order to obtain justice. The commission may proceed of its own motion, without complaint.

Any person, firm or corporation may make complaint on account of an injury done to another. With or without complaint the commission may investigate, and upon investigation make orders requiring carriers to pay damages, to make reparation for wrong done, to cease from doing wrong.

And all this, in addition to risks of prosecution in criminal proceedings of agents and officers of carriers through whose agency the law is violated.

It is said that the existing remedies are inadequate, and that the commission should be given the power to make rates, if not in the first instance, in the last instance, which is the same in effect. The only difference I can see between a commission of five men fixing the rates on all the railways of the country and a commission operating under government ownership is a difference in name. In either case the business of the country would be face to face with the worst financial crisis we have ever been called upon to meet.

The rate-making power is now exercised by experienced men, each representing not only the interest of the line of railway with which he is connected, but of the patrons of the line; the increase of the business of the patrons meaning also an increase of the business of the company. This power is subject to the control of the interstate commerce commission, and also the competitive conditions and forces by land and water between markets, manufacturers and producers throughout the world.

Because difficulties have arisen in the enforcement of the law growing out of failure to prove its violation, it is proposed to amend the law, not in such way as to make it less burdensome under given competitive conditions or to make proof of the violation of the law less difficult, but by conferring upon five men, or three, if the five do not agree, the power to regulate the earnings of railway companies by fixing rates.

This is, in effect, to give to the commission, a political body, power to make or break railway companies, to send their stocks or bonds up or down in the market, to control importations, to limit exportations, to build up or ruin cities by establishing differentials, to array one section against another.

Should the commission be given rate making power it would have absolute dominion over the commerce of the country and over all interests dependent upon such commerce. It is to be feared that evils would result from the granting and exercise of such power, compared with which existing evils or alleged existing evils are as nothing.

A railway corporation has only such rights as are given to it by the state in which it is incorporated.

A railway company, in order to obtain money with which to construct its line and carry on its undertaking, is granted by the state a right to sell bonds and stock in the markets and to those who are willing to purchase.

The ownership of stock of a railway company is a matter of interest or concern to the territory served by the railway company to the extent that it is held by those who have purchased it as an investment and have an interest in the territory served by the line in promoting its settlement, encouraging its growth and increasing its traffic.

There is a common interest between a railway company, that is, between those who hold its bonds and its stock, and the territory served by its line. The bondholder has an interest in the earnings to the extent of the interest on his bond; the stockholder to the extent of obtaining reasonable dividends upon his stock.

The amount of interest and dividend charge is limited. Only such rates can be maintained as will yield net earnings sufficient to pay interest and reasonable dividend.

The common interest of the territory served by a railway company is in obtaining transportation and reasonable service at a low rate and at such rate as will enable those who live in the territory to sell what they produce, or have to sell, in available markets at a fair profit.

"The price of transportation must always be such as to enable the company to pay interest on its obligations and a reasonable dividend to the holders of its stock. If that amount is earned upon a light traffic, the rate per unit of traffic will be higher than it would be if the traffic is heavy. The interest of the territory along the line of the railway rests mainly in the increase of the density and volume of traffic.

The amount of money received from the sale of bonds and stocks having been invested in railway construction, the company has a right to earn an amount sufficient to meet its interest and dividend obligations. It is for the public interest that the amount to be earned should be derived from a large volume of traffic at a low rate, rather than a small volume of traffic at a high rate.

If the earnings which the railways are entitled to receive were to be derived solely from traffic beginning and ending on their respective lines, the rates or price of transportation would necessarily be much higher than it is. The interest of the public served by the railways is largely in the increase of the volume of interstate and international traffic over the lines.

Take, for instance, the lines of the Great Northern and Northern Pacific from Lake Superior and the Mississippi river to Puget sound. All the interstate traffic they can obtain from the great freight-producing area south of Lake Superior and east of Chicago must come to them across the lakes, which are closed to navigation one half of each year, or around the south end of Lake Michigan by way of Chicago.

To increase the volume of traffic and thus be able to reduce rates, these two companies must secure a share of the interstate traffic from the territory named and must also be able to reach territory furnishing market for the freight produced along their lines and return freight to be transported over their lines and by steamship connection with Pacific coast terminals.

If the stock of the railway is held as an investment by those interested in the territory served by the lines, in increasing the volume of traffic and in reducing the rates, the territory will be built up and rates will be lowered.

If the question of the ownership of stock was left to the public served by the lines of the railways of the country, would it not be for the interest of the public to have such ownership placed in the hands of those who had acquired it as an investment and whose interest is directly connected with the building up of the lines and building up the territory served by them?

There has been a great deal of public discussion about railway competition and a large amount of volunteer literature has been written on the subject. It is always a safe basis to assume that no business will continue for any length of time if the result of its transactions is a loss, and this is equally true of your business and of that of the railways.

No individual, community or nation can afford to build up its commerce on the foundation that railways will destroy each other for the general benefit. This has been done in some cases in the past and the roads which have followed this course have gone through the portal of bankruptcy into the hands of rival owners, and, in some cases, into the hands of owners whose greater interest is in other directions, and whose object in obtaining them has been more to restrict the growth of the country than to increase it.

Competition in railway rates is either active or inactive. All railway rates are the subject of conference between the lines interested, followed by an agreement as to rates, and the conditions of the business of the country demand that this course must always be followed.

All rates are by law made public, and whatever rate is adopted by one road must be adopted by the others, or they will lose their share of the traffic. In this there is no active competition.

When competition is active, tariffs are disregarded and private rates are made to large shippers and rebates paid, amounting, as has been published, to enormous sums in the yearly aggregate. To prevent this active competition, both the federal government and the several states have enacted laws which have been a dead letter on the statute books until public opinion has demanded that the various commissions take some action under the law.

The recent activity of the interstate commerce commission has resulted, I believe, to a large extent in correcting this abuse, and, if they follow it up with the power conferred upon them by the act of congress, the entire system of private rates will be abolished to the advantage of the trade of the whole country, and of the railroads as well.

There is, however, a competition between the railways which will continue to exist as long as the railways are run, and that is the competition of markets; the necessity of building up the various interests of the country served by the respective railway lines. In this the competition lies between the producer and the railway in one locality, acting together, against the producer and the railway in another locality, competing for the business.

If the railway is to increase its traffic, it can only be done by increasing the business of its consumers. This same principle applies to the occupation and cultivation of the land along the lines of railway throughout the country, and particularly applies to the lines west of Chicago.

Unless the farmer can make money by the cultivation of his land, either through selling his wheat, his grain, his cotton or his stock, with a profit to himself, the time must come when he will cease to cultivate the land, and the railway is left, as it were, in a desert.

For the past twenty years or more I have had some experience in opening up and peopling new states, and we have always adopted as a fixed policy the making of rates on the products of the country seeking a market, and the necessities of life, such as coal, lumber, and building material, at the lowest rates the company could afford, looking more to our profit from the lighter articles of merchandise and shelf goods consumed in the country. At times we have been criticised for this, this criticism mainly coming from merchants who have desired a lower rate.

The following will illustrate our answer and the reason for the course we have pursued: Take a farmer in Iowa with a hundred acres of wheat yielding, say, twenty bushels to the acre, two thousand bushels, or sixty tons. A reduction of five cents a hundred, or a dollar a ton, would amount to him to $60 per annum.

If he visits the country store once a week for fifty-two weeks and takes away from the store each week fifty pounds of merchandise, in a year he will have taken twenty-six hundred pounds, the entire freight on which would not have averaged 40 cents a hundred, or $10.40, so that if the railway carried the merchandise for nothing and charged an additional 5 cents a hundred on his grain, the farmer would be worse off by nearly $50 a year.

This illustration, I hope, makes plain the statement that the prosperity of the people served by the railway is the only path to prosperity for the railway. The railway and its patrons must always prosper together or suffer together.

The greater the volume of business the lower rates can be made. If, for instance, a railway has to raise a million dollars on a traffic of a million tons, a simple calculation shows that its profits must be a dollar a ton; if there are two million tons, 50 cents a ton, and if there are four million tons, 25 cents a ton will bring the same profit.

In order to secure this additional tonnage intelligent railway management is constantly called upon to secure for the producers on its various lines a market for their productions, and, if possible, a return load for the car carrying such product to market.

We have on the Pacific coast the largest body of first class saw timber left in the United States. When I first visited that country, with a view to extending our lines to the coast, I saw at once that unless we could carry their lumber to market at a price that would enable them to manufacture and ship it with a profit, our railroad would have no business. The first and great crop of that country is its lumber.

We made a rate of 40 cents a hundred for 2,000 miles, or 4 mills a ton per mile, on this lumber, in order that we might load back the cars that carried out the merchandise to the west. This rate was necessarily met by other roads, and the result was the expansion of the lumber trade of Washington and Oregon, so that to-day it is over ten times what it was nine years ago, and in place of seeking additional loads for our cars from the west, we are now seeking additional loads for our westbound cars going out to be loaded with lumber for the great treeless states of the middle west, and the development of this Pacific coast lumber traffic will work a greater change in the Oriental trade of the country than all the efforts of all the men engaged in that traffic.

To enable us to keep pace with the enormous demand for this lumber was the moving cause of our building the largest ships in the world, through which we are prepared to meet not only the rates of other transcontinental lines, both in the United States and Canada, but we will meet the rates made by steamer from the Atlantic ports via the Suez canal.

Every manufacturer reached by any railway in the United States can ship his goods to the Orient by rail to the Pacific coast and thence by steamer at rates that will compete with water transportation from the Atlantic seaboard to the east by way of the Mediterranean and Suez canal. Were it not for the certainty that there is a carload of lumber waiting for every empty car that we can furnish on the Pacific coast, we could not carry the Oriental business at twice the rates we will offer.

Much has been said about the increase of traffic in the east. I will use as an illustration what has occurred in Japan.

Twenty years ago the foreign trade of Japan was not to exceed $1 per capita of the population. To-day this trade is equal to six or seven dollars per capita of its population.

Twenty years ago it amounted to about $40,000,000 and to-day it amounts to about $250,000,000, of which the United States' share is less than one-fifth.

Ten years ago we exported about $5,000,000 annually to Japan, and imported from her about $26,000,000. Now, our exports to Japan amount to $30,000,000, or six times as much as they were ten years ago, and the increase in our imports has been very small.

In 1890 the entire foreign trade with China amounted to about 90 cents per capita. With a good stable government which will protect the Chinaman in the fruits of his own labor and enterprise, there is no reason why the Chinese trade should not increase as rapidly as that of Japan has increased. The Chinaman is the better merchant of the two.

Should the Chinese trade increase to three or four dollars per capita, it would amount to more than the entire exports of the United States, and, surely, this trade is worth striving for.

The Oriental trade has built up cities of the old world which are now in ruins. Its value runs back to the very dawn of history. Byzantium enjoyed this trade for a time, and later on it built up Venice, the city of merchant palaces, which for years was the gateway from the east into Europe.

When the Portuguese sent their ships around the Cape of Good Hope, followed by the Spaniards, they took possession of this trade and transferred it from the backs of camels to their galleons. From them it passed under the control of the Hanseatic league and the cities of Holland and Belgium.

Early in this century Great Britain, through a wise and far seeing policy inaugurated by her ablest statesmen, took possession of the trade and has retained it to the present time, for the reason that she furnished the lowest rates of transportation to and from those countries. We are now preparing to challenge her for such share of this business as can be furnished by the manufactures of the United States.

A country where labor is paid from 10 to 25 cents a day cannot indulge in many luxuries, and our trade with the Orient must be largely in the necessities of life and such articles as they cannot produce.

We have already built up a large demand for American cotton and flour, which a few years ago were unknown in China and Japan. This cotton mainly goes from Texas and other southwestern states, and it may surprise you to learn that seven-eighths of it during the past year has gone by way of Puget sound ports.

With Manila as an American port in the east and the best ships that can be built, we should be able to maintain ourselves as a nation in the control of a large share of this traffic.

We enjoy to-day a share of the traffic of the various European nations under such conditions as their tariffs will allow. Great Britain is our best customer. She buys about two-thirds of all our exports to Europe, and until recently, she has received our products on conditions as favorable as those enjoyed by her own colonies.

We cannot, as a nation, go on receiving the great balance of trade which has been paid us for the past few years. Our balance of trade some years has been double the production of gold and silver in the whole world, and, logically, if it should continue the time would come when we would have all the gold and silver and our customers would be bankrupt.

This condition would only be less unfortunate for ourselves than for them. Our customers must have the means to pay us, and to get this means they must sell something to somebody.

We have enjoyed all the benefits of a protective tariff for many years, and whatever good it can do in the way of building up infant industries has already been accomplished.

The growth of our enormous iron and steel industries, which are pointed out as the result of our protective tariff, can be more surely traced to our enormous resources in the iron mines of Michigan, Wisconsin, and Minnesota than from all other sources. The cheap production of the highest grade of ore in these mines and the low rates of transportation to Lake Erie ports have done more to build up the iron and steel industries of the United States than all the tariff that have ever been placed upon the statute books, and to-day, if these mines were closed, our superiority in the iron and steel trade of the world would be gone forever.

There is another subject which I think will not be devoid of interest to the manufacturers, and that is the so-called trusts or combinations of capital.

In a country as large as ours, carrying on enormous undertakings, large amounts of capital are necessary, and this capital can be more readily furnished by corporate ownership than in any other way. There are a few individuals in the country who might furnish fifty or a hundred millions of dollars with which to carry on any particular branch of business, but there is no certainty that they would furnish one dollar.

A man with that amount of money does not need all the trouble and annoyance attending a large business of any kind, so that it is necessary that this work shall be done through corporate effort, and no harm is likely to come to the country growing out of the magnitude of the business.

Has the enormous business of the Krupp company in Germany injured the German nation or any of its people? On the contrary, the nation and the people are proud of the name of Krupp.

Can any one in this country point out an injury inflicted on the people which can be traced to the magnitude of the Carnegie company?

The only serious objection to trusts has been the method of creating them—not for the purpose of manufacturing any particular commodity in the first place, but for the purpose of selling sheaves of printed securities which represent nothing more than good will and prospective profit to the promoters. If it is the desire of the general government through congress to prevent the growth of such corporations it has always seemed to me that a simple remedy was within their reach.

Under the constitutional provision allowing the congress to regulate commerce between states, all companies desiring to transact business outside of the state in which they are incorporated, should be held to a uniform provision of federal law, that they should satisfy a commission that their capital stock was actually paid up in cash or in property, at a fair valuation, just as the capital of the national banks are certified to be paid up by the comptroller of the currency. It is only fair to a dealer in Minnesota or California or Oregon, that if a company claims to have ten, twenty, or fifty millions of capital, desiring to do business in that state, that the dealer should know that the company's solvency has been passed upon by a federal commission and that its capital was what it was advertised to be.

With that simple law, the temptation to make companies for the purpose of selling prospective profits would be at an end, and, at the same time, no legitimate business would suffer nor would any number of individuals, desiring to engage in business through a corporation, suffer any hardship because their actual capital was as they advertised it to be.

We have been as a nation too ready to look to state and federal legislation for remedies which are beyond their power to give. The laws of trade are as certain in their operation as the laws of gravitation. You might as well try to set a broken arm by statute as to change a commercial law by legislative enactment.

You may obstruct and delay for a time, but in the end the inexorable law of experience, and the survival of the fittest will prevail. That is the universal law of nature in every branch, and in its working it is eternal.

Let us, therefore, leave well enough alone. That which is good let us keep and that which can be made better let us approach with intelligence and work together for the accomplishment of results that will benefit, not only one, but all the various states of the country, and, in that way, secure the prosperity of the individual and separate interests as well.

AMERICAN TRANSCONTINENTAL LINES.

BY JAMES DOUGLAS.

[James Douglas, mining engineer and president of the Copper Queen Consolidated Mining company; he was born in Quebec, and received his education at Edinburgh, Scotland, and Queen's university, Kingston, Canada, graduating from the latter in 1858; for several years afterward he was professor of chemistry at Morrin college, Quebec, and since 1875 has lived in the United States, coming for the purpose of taking charge of some copper works at Phœnixville, Pa.; he afterwards interested himself in the copper industries of Arizona, where he is president of a number of companies, including the Copper Consolidated Mining company, and where he has done a great amount of original work in the hydrometallurgy of coppers; he is the author of Canadian Independence, Imperial Federation and Annexation, and many technical reports and papers.]

The Anglo-Saxon race is enterprising, but it cannot lay just claim to being adventurous. Its migratory movements have been made in no spirit of levity, but from strong religious motives, at the bidding of liberty or under the stress of over-population. Such movements, having their origin in deep racial impulses, have been slow in their inauguration, but irresistible in their progress and permanent in their results. When, therefore, the race occupies territory it rarely abandons it. If it moves less rapidly than more excitable races, its tenacity in the end proves to be in proportion to its inertia.

The progress of the race on this continent is a commentary on these characteristics. Columbus set foot on one of the Antilles in 1492. Within half a century Spain and Portugal sent out over half a hundred discovery expeditions, and explored, with one debatable gap, the whole coast line of North and South America from Greenland through the Straits of Magellan to the Cedros islands, off the coast of lower California. Within that period Spain had occupied the principal West Indian islands, conquered the empire of the Aztecs and the Incas, crossed our continent from Florida through Texas and Chihuahua to the Pacific, and ascended the Mississippi to the buffalo country. From the Pacific coast of our continent the Spaniards had penetrated through Arizona into New Mexico and Colorado. On the west coast of South America all the country under the sway of the Incas, including a large part of Ecuador, Peru and Chile, was actually brought under Spanish rule, and Spain and Portugal were already rivals in discovery and occupation on the east coast of the continent. Meanwhile Portugal had doubled the Cape of Good Hope and opened up trade with the East Indies.

That paroxysm of adventurous discovery in the fifteenth and sixteenth centuries hardly touched England, and France played a hardly more conspicuous part. But in the seventeenth century, however, we find the rôle of discoverers being played by the French. The English have founded a string of colonies along the inhospitable seaboard of New England and the hardly more attractive coast of Maryland, Virginia and the Carolinas; but their efforts are all directed towards making comfortable homesteads in the wilderness, framing representative systems of municipal government, and securing political rights from or independently of the mother country.

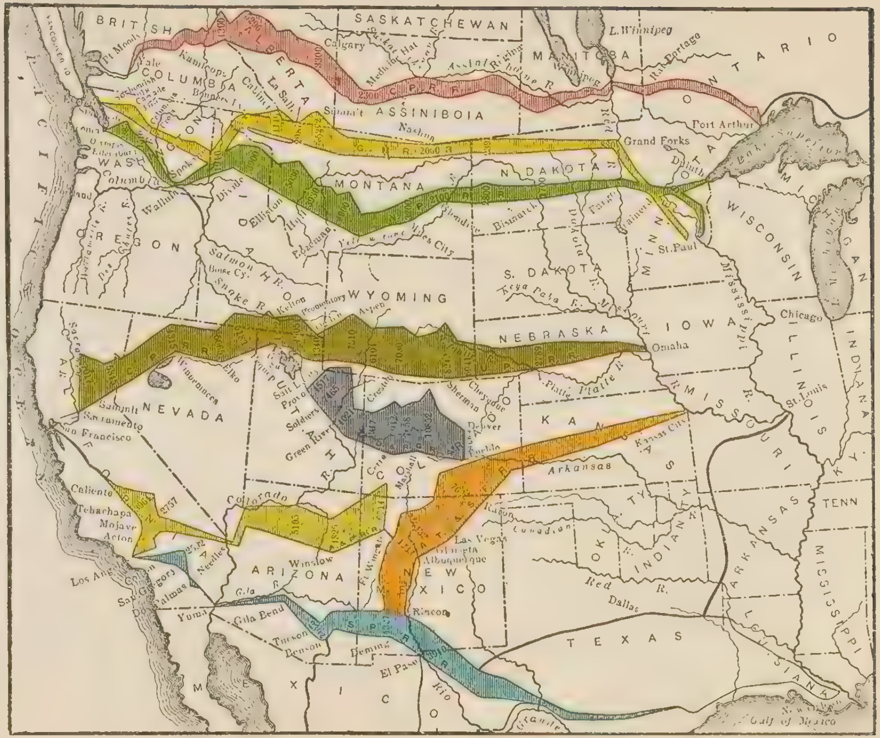
A small Dutch colony has planted itself on the Hudson, but home was even dearer to the Dutchman than to his rival, the Yankee. Spanish enterprise has been completely stifled by the extortion and grasping colonial policy of the crown. But the French have occupied Jacques Cartier's discoveries, and French traders, hand in hand with French missionaries, are penetrating the very recesses of the northern continent. Already long before the close of the seventeenth century, and when the English are commencing to open up by sea a trade in furs with Hudson bay, the French have established missions and trading posts as far west as the head of Lake Superior, have discovered and navigated the Mississippi almost from its source to the Gulf, and surrounded the English colonies with a chain of forts. As there was no such racial antagonism between the Frenchmen and the aborigines as separated the English from the red men, their coureurs de bois, adopting Indian ways and marrying Indian wives, are wandering through the Rocky mountains and bringing back stories of the sources of the Missouri. The different spirit actuating the two peoples is well expressed in this phase of their social habits. A Virginian churchman or a New England puritan populating the Atlantic coast with half-breeds would be an anomaly we cannot, by the utmost stretch of imagination, even conceive of.

A century later, at the time of the collapse of the French power in America, we find the English colonies as lethargic as before. The Hudson and Mohawk valleys had brought the English and Dutch of New York into contact with the French, and into competition with the French fur trade, but the traffic was apparently uncongenial, and not pursued with energy. English enterprise here and elsewhere seemed to be sea bound. It was unable to leap the Alleghenies. It seems absolutely incredible that a community of England's hardiest and most intelligent sons should have been content to remain for two centuries hemmed in between the sea and the Alleghenies, uninspired by the slightest curiosity to know what filled the great gap of three thousand miles between their home and the western sea.

Carver in 1766–67–68 explored the headwaters of the Mississippi, and described the country north and northwest of the head of Lake Superior, already long and well known to the French. He tells stories of the tribes reported to live to the west of the Shining mountains, who had gold in such plenty that they made their most common utensils of it. These rumors stimulated him to try to cross the continent, but more than one attempt of his had failed when the war of independence broke out and frustrated his and his companion Whitworth's final plans. Mackenzie, in 1789–93, following the wonderful waterway which, north of the British line, links the waters of Lake Superior with the Pacific by the intervention of but few unimportant portages, traversed the continent from sea to sea, and penetrated the Rockies, by the Peace river, almost to the Pacific.

The American government, to relieve itself from the opprobrium of ignorance, dispatched the Lewis and Clark expeditions in 1805. These officers of the United States army ascended the Mississippi almost to its source, crossed the divide near the line of the Northern Pacific railroad, descended the Clark fork of the Columbia, and reached the Pacific by the main stream, returning the following year in divided parties so as to explore more territory. Yet so

MAP SHOWING ROUTES AND ALTITUDES OF TRANSCONTINENTAL LINES.



small a portion of the vast region did they describe, and so vague was the information to be derived from other sources, that when Astor equipped his expedition by sea and land in 1812 to secure the fur trade of the Columbia, Mr. Hunt, who led the overland party, was in a terra incognita from the time he left the Missouri, which he unfortunately did at a point apparently not far from Yankton, till he reached the mouth of the Columbia.

But while Lewis and Clark were exploring the headwaters of the Missouri, another government expedition under Lieutenant Pike first described the whole Mississippi river, previously known only at intervals, from its rise to its junction with the Missouri. He is the same lieutenant—afterwards Colonel Pike—whose name is so intimately associated with Colorado; for besides giving it to one of Colorado's magnificent mountain peaks, he first, in 1806, ascended the Arkansas, and cutting across the San Luis park struck the upper waters of the Rio Grande. To him also the world owes its first knowledge of the country drained by the Platte. It was, of course, not till after the purchase of Louisiana, at the commencement of this century, that the government took these steps to acquire some knowledge of the margins of its vast domain. But certain sections have remained so secluded that Custer's military expedition to the Black hills of Dakota in 1874, only thirty-one years ago, gave us the first accurate information about that important region.

The old Spanish settlements and towns on the Rio Grande and in southeastern Colorado were linked to California by pueblos, such as Pueblos Viejo, Tubac, Tucson, and thus a through route from eastern United States settlements to the Pacific by the Santa Fé trail had been always open through Spanish territory. The exploration, therefore, of our own continent was incredibly slow. But as in other directions, if we are slow to move, when we do move we move to some purpose. The Spaniards, though great and enthusiastic explorers, left only trails behind them. We are obliterating their trails by railroad beds.

As the northern trail was that taken by the earliest emigrants who led the way to Oregon, its advantages as a railroad route were so apparent that as early as 1835 a railroad from the upper Mississippi to the mouth of the Columbia was actually proposed. But the project was not acted on seriously till 1845, when Asa Whitney nearly succeeded in securing from congress a land grant in aid of the first Northern Pacific, before which more recent grants dwindle into insignificance.

In 1848 the Mormon exodus from Illinois and the occupation of the promised land of Deseret was completed, and the country was surprised at learning that in the heart of the great American desert a land existed which flowed with milk and honey, and only waited to be cultivated. The government, therefore, in 1849, undertook a survey of the great basin under Captain Stansbury and Lieutenant Gunnison.

In 1848 gold had been discovered in California, in the year of its transfer from Mexico to the United States, and the adventurous spirits of both hemispheres flocked thither. To most, the straightest road was the best. Neither the high walls of the Rockies nor the snowy summits of the Sierra Nevada could deter them. California, not Oregon, henceforth became the objective point of the emigrant, and railroad projects now pointed to California, not to Oregon.

The government in 1852–54 sent out surveying parties in search of railroad routes across the mountains. Their work as embodied in the famous document issued by the war office (Jefferson Davis being secretary) between 1855–60: "Reports of Explorations and Surveys to Ascertain the Most Practicable and Economical Route for a Railroad from the Mississippi River to the Pacific Ocean," covered preliminary surveys of five possible railroad routes, as follows:

(1) A route was surveyed by Governor Stevens and Captain Geo. B. McClellan along the 47th and 49th parallels, which nearly corresponds with that now followed by the Northern Pacific.

(2) Captain Fremont, Stansbury and Lieutenant Beckwith surveyed the country between the 41st and 42d parallels, and proposed a route not widely different from that selected for the Union and Central Pacific railroads.

(3) Captain Gunnison lost his life at the hands of Indians, or of Indians and Mormons, while trying to trace a practicable road along the 18th and 39th parallels, through the sea of mountains which the Denver and Rio Grande and the Rio Grande and Western railroads now traverse between Pueblo and the Salt Lake valley.

(4) Lieutenant Whipple surveyed the country now opened by the Santa Fé Pacific railway, near the 35th parallel.

(5) Captain John Pope, Lieutenant Parke and Major Emory described the route along the 32d parallel, now occupied by the Southern Pacific railroad, which the secretary of war recommended as the most desirable on the score of length, climate and gradients. The extension of this route, from the mouth of the Gila to San Francisco, was explored by Lieutenant Williamson.

The state of Missouri was the first to charter a transcontinental route, under the name of the Missouri and Pacific Railroad company. It was to start from St. Louis, and, after running southwest, to follow the thirty-sixth parallel through the present Indian Territory to Santa Fé, and thence across to the Pacific. The civil war frustrated this scheme, but hastened the accomplishment of another. To build a road through a region within the radius of active war was hazardous. Yet California, isolated from the rest of the states, it was seen, must be brought within rapid reach of the central power. Hence the organization of the Union and Central Pacific companies, and the liberal assistance tendered them by government to build a road from the Mississippi to the Pacific, far north of the strife then raging. The charters were signed in July, 1862; the first sod of the Central Pacific was turned on the 23d of February, 1863, but work was not commenced on the Union Pacific till the 12th of November, 1865, after the immediate cause for urgency had passed. Fourteen years, or till July, 1876, was the limit of time allowed by the charter for the completion of the joint enterprise, but the eastern and western sections met, and the last spike was driven at the station of Promontory, on the 10th of May, 1869.

This station was 1,084 miles from Omaha, but only 850 from San Francisco. By recent improvements in the location of the Union Pacific, the distance from Omaha to Promontory (which is now a station on the Central Pacific 24 miles west of Ogden, the junction point) has been reduced to 1,028 miles. The grades have been cut down and the road crosses the summit through a tunnel 247 feet below the former elevation. Yet, taking into account the much greater engineering difficulties which beset the Central road in crossing the Sierra Nevada than those which obstructed the Union road in the Rocky mountains, as much credit is due to the one as to the other.

In 1864, before the Union and Central Pacific railroads had been commenced, the Northern Pacific railroad company had obtained a charter. Governor Stevens's survey in 1853 of the Northern route had proved its practicability, but this company, organized by Mr. Perham, sought in vain for financial assistance till Jay Cooke & Co. came to its rescue and effected thereby their own ruin. Construction was commenced in 1870, but owing to many financial vicissitudes the road was completed only in 1883.

Meanwhile individual energy had been at work in the extreme south of our western domain. Before this date the Southern Pacific had been opened from end to end. While the Texas and Pacific company, chartered in 1872 to construct a road from Fort Worth in Texas to San Diego on the Pacific, was languidly building from the east, and vigorously soliciting government aid, the large stockholders of the Central Pacific were constructing a line from their own resources, along the proposed route of the Texas and Pacific from the California end. And thus before the Texas and Pacific had laid their tracks through the state of Texas, the Southern Pacific had occupied lower California, Arizona and New Mexico, and united with the Texas Pacific proper in Texas at the end of 1882. Contemporaneously, the Atchison and Topeka, originally a road looking for support to the agricultural resources of Kansas, had crossed the Raton spur of the Rockies, earned the right of adding Santa Fé to its title, and, by connecting with the Southern Pacific at Deming, created another Rocky mountain railroad. Since then this company has built an independent outlet for itself to the Pacific at San Diego, over the Atlantic and Pacific railroad (now the Santa Fé Pacific) and the California Southern.

While these broad gauge roads were seeking for valleys and easy grades by which to cross the mountains, a narrow gauge road (controlled by officials, and constructed by engineers, with very broad gauge ideas), the Denver and Rio Grande was successfully combating difficulties and scaling heights which only lavish expenditure of money, handled by the highest engineering skill, could overcome. The marvellous feats which its builders have really accomplished are as wonderful as those the Union Pacific was supposed by popular imagination to have performed. Though commenced as a narrow gauge through line via Pueblo and the Royal Gorge with, subsequently, a branch to Leadville, it was completed by an independent company from Grand Junction to Salt Lake city as a standard gauge road, under the title of the Rio Grande Western railroad. At present it makes connection with the Colorado Midland, by which it secures a standard gauge track from Denver to the Great Basin. But it of necessity retains the 36-inch gauge for its line over Marshall pass, and its many tortuous branches. The Canadian Pacific reached the Pacific in 1884. The last road to link the waterways of the Atlantic coast with the Pacific is the Great Northern. Begun as the St. Paul, Minneapolis and Manitoba, to afford railroad facilities to the rich Red River valley, it was extended into Montana in 1887, and has reached Puget sound at Everett, and tapped the mining regions of British Columbia.

The geographical and topographical features of those sections of the continent which these roads traverse, as exhibited in their profiles, are laid down in the accompanying map.

The Rocky mountains, including the whole system of mountains and plateaus from the plains as far as the Pacific coast, attain their greatest development in height and width along the forty-first parallel, which nearly coincides with the line of the Union and Central Pacific railroads, and there exhibit with marked prominence all their features, the principal of which are high and steep eastern and western chains, the Rocky mountains to the east, and the Sierra Nevada to the west, enclosing an elevated plateau corrugated by diagonal minor ranges.

The profile of the Union and Central Pacific roads exhibits these features better than that of any other road. The plains rise by a grade, so easy as not to be appreciable to the eye, from 968 feet at the Missouri to 6,038 feet at Cheyenne, or 5,070 feet in 516 miles, the country changing with the decrease in rainfall from the rich fertility of the Nebraska prairies to grazing lands, dry and seemingly valueless, but able formerly to support the buffalo and now their tamer successors.

At Cheyenne the Black Hills rise abruptly from the plain; but, like all hills looked at from below, the steepness is illusory, for the train scales them to Sherman, a point 8,235 feet above the sea, in 33 miles, and then descends into the Laramie plains, whose average elevation is about 6,500 feet. As previously stated, the new Union Pacific cuts through the summit of the Black Hills by a tunnel at 247 feet below the former elevation, and, as Spearman in his "Strategy of Great Railroads," says, "There are but two pieces of track, both very short, on the entire main line where the forty-three foot grade is exceeded." (To reduce the maximum grade to forty-three feet was the task set Mr. Berry, the engineer.) "Curvature has had to go with the heavy grades, and between the Black Hills and the Wasatch range seven thousand degrees within the last five years gradually disappeared. At one point the new line, within a distance of four miles, crosses the old one seven times."

The Uintah range, whose axis is nearly east and west, is now the conspicuous feature to the south, its sides covered with forest, and at its base Beaver creek, which was Bridger's favorite trapping ground for the American Fur company as far back as 1820. Up the Big Muddy the railroad now ascends a spur of the Uintah, crosses it at Aspen at an elevation of 7,835 feet, and descends into the valley of the Bear. This stream, like many others in the Rockies, doubles on its own course. It rises to the south of the track, flows north, outflanking the Wasatch range, and returns south to discharge, after a course of 230 miles, into the Great Salt lake, not over 60 miles west of its source. But the railroad builders tunnelled the high jagged range at Wasatch, and carried the track through the wonderful rock scenery of Echo and Weber cañons, down the steep western slope of the Wasatch to the Salt Lake valley at Ogden. To secure some of the traffic of the Northern Pacific states, and gain closer access to the sea, the Union Pacific built the Oregon Short Line, which runs diagonally through parts of Wyoming and Idaho from Granger in the former state to Huntingdon on the Snake river, where it connects with the Oregon Railroad and Navigation company, which affords the most direct route to Portland via the Columbia river.

Five roads radiate from Ogden: the Union Pacific towards the east; the Central Pacific towards the west; the Denver and Rio Grande towards the southeast; the Utah Central runs due south down the valley; and the Utah Northern, now owned by the Oregon Short Line, built first as a narrow gauge road, but, in consequence of the extraordinary growth of Butte, converted into a standard gauge, runs due north through the eastern section of Idaho into Montana, crossing the main track of the Oregon Short Line at Pocatello, and makes junctions with the Montana Central, the Butte branch of the Great Northern, at Butte, and with the Northern Pacific at Garrison, at the western foot of the Rocky mountains. But the original, and still the main connection of the Union Pacific, is the Central Pacific.

From Ogden westward the Central Pacific, after crossing from the Utah into the Nevada depression of the Great Basin, descends by easy grades to the eastern foot of the Sierra Nevada, through a region even more desolate than that traversed by the Union, between naked mountain ranges, over long stretches of rolling sage brush plains, hardly redeemed from utter sterility by a ribbon of verdure on the banks of the Humboldt river. The railroad follows the valley of this river from Moore station for a distance of 350 miles till it enters the Humboldt lake, and flowing thence, loses itself in the sink of the Carson.

Carson lake, which, like the Great Salt lake of Utah, is the residuary recipient of the whole river and lake system of this portion of the Nevada desert, has no outlet. The valley of the Truckee was selected by the railroad engineers as the most feasible route out of the basin. In approaching the valley of the Truckee, the railroad traverses, from Lovelocks to Wadsworth, for about 63 miles, a desert region white with alkali, and full of solfataric activity, bubbling with hot springs, which are saturated with soda and borax, and underlaid by beds of brimstone, it follows the narrow channel of the Truckee, too barren generally to produce much, even with irrigation, and reaches the town of Truckee, a distance of 62 miles, gaining an elevation in that distance of 1,742 feet. At Truckee commences the pull up to the summit, a distance of only 14 miles, in which 1,198 feet of elevation are gained. Down the western slope of the Sierra the train speeds from the summit at 7,017 feet to Colfax, a descent of 4,595 feet in 51 miles, through the pines, into the oak glades, and to the plains.

Under Mr. Harriman's administration changes as notable have been made along the line of the Central Pacific railroad as of the Union Pacific. Curves have been straightened, grades cut down, two hundred miles of new road have been built in improving the alignment, and two miles of tunnels bored. Instead of winding round the northern end of the Great Salt lake, a trestle twenty-three miles long carries the trains in a straight line across the lake itself. While these changes have been in progress, others more important have been carried out under the Reclamation act, looking to the irrigation of the desert with the waters of the Truckee and Carson rivers.

The Denver and Rio Grande, as already observed, surpasses all competitors in the feats of engineering its builders have achieved. Each of its branches was, at the time of construction, the most remarkable deed of daring yet attempted, and each successive effort has surpassed its predecessors in boldness of conception and execution. The main line as originally located ran from Pueblo, over the Marshall pass, to Salt lake. In its course it cuts the Rockies at their highest and widest, to the west of Pueblo, taking advantage of the Arkansas to reach the water shed of the continent at Marshall pass. The Royal gorge, in the Grand cañon of the Arkansas, is the portal which admits the traveler from the plains into the recesses of the mountains where the river receives its life. Above the cañon the valley widens, and is productive of grasses and of such vegetables as the great altitude permits of coming to maturity. At Salida the branch to Leadville continues up the Arkansas, but the main road ascends the Saguache range to the continental divide. This is crossed by Marshall pass at an elevation of 10,820 feet by grades reaching 220 feet to the mile.

The Tomichi river, the main confluent of the Green, is reached almost at once after the divide is passed, and where this branch unites with its northern sister to form the Gunnison, is rising the city of Gunnison, at an altitude of 7,680 feet. Below Gunnison the river cuts through mountain and plateau, creating the Black cañon of the Gunnison, less gloomy than the Grand cañon of the Arkansas, and enlivened by a greater variety of rocky outline, for the gorge has been carved out of limestones and sandstones, instead of riven through the old crystalline rocks. It is broader, and is streaked with color derived from the weathering of the rocks, as well as from vegetation. The Gunnison cañon becomes more rugged below Gold creek, and rather than follow it the road crosses Squaw mountain and joins at its western base the Uncompahgre branch of the Gunnison. This it follows to its junction with the main river at the town of Delta, and it still keeps to this highway of nature across the Grand mesa till it unites with the Grand river at Grand junction. For 200 miles farther westward the Rio Grande Western road ascends a series of barren steppes before surmounting the Wasatch and entering the Great Salt lake valley. From Grand junction to the Great basin, the Rio Grande Western is of broad gauge. At Grand junction the narrow gauge Leadville link of the Denver and Rio Grande, which left the original main line at Salida, rejoins it after having tapped Leadville, the Aspen district, and Glenwood springs, and crossed the range by the Tennessee pass.

The newer Denver and Rio Grande route to the Pacific coast leaves Salt Lake city, skirts the southern shore of the Salt lake, but in crossing the Humboldt desert crosses the track of the Central Pacific railroad, surmounts the Sierra Madre by a pass some 2,000 feet below that of the Central, and so safely below the normal snow level that snow sheds have not been provided; it drops down the western slope of the range by the Feather river in the beautiful Oroville valley, where, though it is north of the Sacramento, the climate is so temperate that oranges and lemons flourish.

The Colorado Midland, a standard gauge road, which runs from Denver through Colorado Springs, Manitou, and Buena Vista to Leadville, follows a parallel route to the Denver and Rio Grande from that point to Grand junction. Leadville, therefore, enjoys the services of three roads—the Denver and Rio Grande, a branch of the Union Pacific, and the Colorado Midland.

The Southern Pacific is now the only United States railway whose termini are on the two oceans—the eastern at New Orleans, the western at San Francisco. It runs through the swamps and across the bayous of Louisiana, over the low coast lands of Texas to Houston, and thence traverses from east to west its fertile cotton fields to beyond the old Spanish town of San Antonio, where the land grows less fertile. At 170 miles from San Antonio the road enters the cañon of the Rio Grande. Through this it is built on benches overhanging the river, and within a stone's throw of the Mexican shore, till it reaches the undulating limestone plateau through which the river has cleft this narrow trough. On the plateau the scenery differs from that of the plains to the north only in the vegetation which clothes it. We are on the "Llanos estacados," the "Staked plains" of other days. Though no river runs for hundreds of miles through this dreary waste, springs occur, and water in many places is pumped to the surface to supply the cattle and sheep which roam over this scorched wilderness. These, though necessarily few in number to the mile, are an immense multitude in the aggregate. Not a hill breaks the horizon for more than a hundred miles, but the road ascends gradually to Sanderson, where short isolated ranges commence to rise out of the plateau, and the mountain scenery assumes the aspect which it henceforth bears along the line of road all through New Mexico and Arizona, till the Colorado is passed and the Yuma desert is entered. This company operates to-day the Central Pacific to Ogden, Utah, as well as the through line from Portland, Oregon, to San Francisco, Los Angeles, and New Orleans, with many branches, comprising nearly all of the railroad system of California.

The Southern Pacific has been running its trains through to the Atlantic for five years before it connected its southern California section with the Oregon road, which ran south from Portland through the Willamette valley. That amalgamation and connection made, the Southern Pacific company has been in a position to tap by its own track the trade of the whole Pacific coast, almost from Puget sound to the Mexican line, to drain the heart of the continent by the control of its central section, and to span the continent from the Pacific to the Atlantic. The most important recent changes in the Southern Pacific consist in the same ameliorations of the permanent way and rolling stock as have been introduced by Mr. Harriman into all the railroads he controls, and the building of a coast line from Saugus, just north of Los Angeles, via Santa Barbara, to San Mateo, near San Francisco, by which the beautiful scenery of the seacoast and the western flank of the coast range can be seen by the traveler, if he prefers it to the wonderful expanse of fertility with the Sierra Nevada as a background, which the San Joaquin route offers him.

The Atchison and Topeka started as a Kansas prairie road, but through its ramifications it has become the most extensive of all the mountain railroad systems. The mountain section commences at Trinidad, Colorado, where the road has risen upon the plains from 765 feet at Kansas City, to 6,000 feet at Trinidad, in a distance of 652 miles. At Trinidad, in the midst of a coal field extending to both sides of the Raton range, the ascent of this spur of the Rockies commences, and is completed in twelve miles by a tunnel at an elevation of 7,622 feet above the sea. The road now issues on those vast rolling plains which spread over northern New

Mexico, Texas, and the Indian Territory, and which feed a thousand rivulets that combine to make the Red and Canadian rivers, discharging into the Mississippi, and the Pecos, which helps to swell the lower Rio Grande. The road proceeds south with the snowy range of the Sangre de Cristo bounding the view to the west. Behind that flows the Rio Grande, and only beyond that again rises the continental divide. Over it the line does not pass, for after crossing the plateau for 175 miles at elevations varying from 5,000 to 6,600 feet, it mounts the Sangre de Cristo range (here the Glorieta), descends into the valley of the Rio Grande, and follows it for 300 miles to the Mexican frontier town of El Paso.

But at the old Spanish town of Albuquerque a cross road branches west, which completes the transcontinental character of the Atchison and Topeka. It was built as a section of the St. Louis and Pacific, which is itself a survival of the old Missouri road. It runs for all the distance between Albuquerque, on the Rio Grande, and the Colorado river, at the Needles, through the most mountainous section of New Mexico and Arizona, at a very high average altitude. The continental divide is passed near Coolidge, at an elevation of 7,257 feet, and the road subsequently runs among heavily pine-clad ranges, past the foot of the San Francisco mountains, parallel with, and at one spot not more than twenty miles south of, the Grand cañon of the Colorado, and over the southern extension of the Great basin. The Colorado river crossed, the road traverses the same dreary waste which in the south we knew as the Yuma desert, and in the north as the Humboldt desert, ere it joins the Southern Pacific at Mojave station. The Southern California, which branches south from the main line at Barstow, crosses the San Bernardino range into the fertile San Gabriel valley, and completes the connection of the Santa Fé system with the Pacific at Los Angeles and San Diego. The principal western addition to the Santa Fé system has been a road through the San Joaquin valley from Bakersville to San Francisco, and the purchase of the Santa Fé, Prescott & Phœnix, a north and south road through central Arizona, whose junction with the Santa Fé Pacific is at Ash Forks. The Chicago—Kansas City and Oklahoma & Texas line—and the Gulf lines, with their branches, give to the system a total length of over 10,000 miles.

We have seen that a Northern Pacific railroad was the first proposed, but almost the last built of the first group of transcontinental roads. As now constructed its eastern terminus is at St. Paul. Thence it sweeps for 275 miles over the rich prairies of Minnesota, then spans the Red river of the north, pursues its way due west still through the most fertile farm land, crosses the Missouri at Bismarck, and sweeps onward again over deep, rich, black soil, a total distance of about 586 miles from its starting point, till the Bad Lands of Dakota are reached near the Montana boundary. There it crosses the curve of average rainfall which defines the farming lands that can be cultivated without irrigation. This curve sweeps northward across the Canadian frontier; but the road stretches westward with the foothills of the Rockies. The great eastern buttresses of the Rocky mountains now loom into view, but the road remains on the prairies, skirting the Powder range till it strikes the Yellowstone river at Glendive. To this valley it clings for 340 miles, as far as Livingstone, where this most important of the northern affluents of the Missouri comes in from the south, where it draws its waters from the heart of the Rockies and enhances the beauties of the Yellowstone park. From St. Paul to Livingstone the grade has been easy and the elevation low. But the road after leaving the Yellowstone commences to climb the Bozeman range, a spur of the Rocky mountains. It cuts off the summit by a tunnel, at an elevation of 5,565 feet, and emerges in a wild gorge which it follows along the stream of the Gallatin to the base of the range. Here it enters the birthplace of the Missouri, an amphitheater of great hills where the Gallatin, the Madison and the Jefferson unite their waters to form this mighty transcontinental river which thus springs into existence as a stream of considerable size. We follow its banks for thirty miles, till the Rocky mountains bar the river's further progress westward. It is prevented, however, from reaching by a straight course its destination in the eastern sea by the confused mass of the Little Belt mountains, round which it sweeps through Clark's gate of the Rockies due north, over the falls of the Missouri, and thence as a navigable river eastward. The road, after leaving the river, pursues its way westward, crossing the continental divide through the Mullen tunnel, at an elevation of only 5,648 feet.

We are now in the golden land, and almost every valley has been turned over and over in search of the precious dust. The beautiful town of Helena, near the foot of the divide, stands in a wilderness of boulders, heaps and trenches, and the surface of the valleys near Butte, Bannock and Virginia City, and many another spot, looks like the Bad Lands of Dakota in miniature, tossed out of all shape by the myriads of miners who, from 1861 when gold was first discovered in Deer Lodge county, till recently, have extracted from the shallow placers of this section of Montana over one hundred millions of dollars.

Tortuously the road ascends the eastern slope of the continental divide from Helena at 3,980 feet to the tunnel, affording a magnificent glimpse of the mountains to the south, which enclose the National park; but the western descent is less rapid into the valley which carries towards the Columbia the waters of Deer Lodge creek. The mountains close in—the Bitter Root mountains on the left, the main range on the right—till the valley is contracted into a gorge, rendered more sombre by the heavy growth of pines which clothe the rocks; for, now that we have crossed the mountains, both plain and hill are forest clad. Northwest the road runs along the banks of the streams, now swollen into the Clark's fork of the Columbia, unable to escape westward over the high Bitter Root range. Where Clark's fork expands into the beautiful lake of Pend d'Oreille the road finds egress from the mountains and enters the northern extension of the great plateau, which we have traversed in Arizona, and again when crossing the Great basin on the Union and Central roads. The road cuts diagonally across the basin from the northeast to the southwest, through Spokane, till it strikes the Columbia at Pasco and Ainsworth.

From Pasco it continues to cross the basin in a northwest direction, and then ascends the Cascade range to the Stampede pass, at an elevation of 3,980 feet. It descends rapidly to its termini at Tacoma and Seattle on Puget sound.

The Oregon Railroad and Navigation company supplies the direct route through Spokane to Portland via Umatilla, where it unites with the road from Huntingdon, and the Oregon Short Line. Pasco on the Northern Pacific and Umatilla on the Oregon Railroad and Navigation company's line, are near the great bend of the Columbia, where it turns to break through the Cascade range.

The gorge which this magnificent river has cut through these mountains—the representatives of the Sierra Nevada—for a distance of over 200 miles, was taken advantage of by the railroad builders to make their escape to the sea. The engineering difficulties in the construction of the road in this section were excessive, for so precipitously do the banks rise out of the water below the Dalles that the roadbed had in places to be carved out of the rocky escarpment. The Cascades here soar into magnificent proportions, a number of peaks rising above the snow line, such as Rainier (Tacoma), 14,860 feet, and Mt. Hood, 11,025 feet.

The Great Northern is the descendant of the St. Paul, Minneapolis and Manitoba, a road which was built to tap the Red river of the north. After its reorganization it was extended through northern Dakota into Manitoba, while still retaining its original designation. Not till it left the valley of the Missouri and attained the dignity of a transcontinental road did it assume its present more appropriate title.

The main line runs almost due west, after escaping from the obstruction which the mountains oppose to its straight path. At the northwestern corner of the Bear Paw mountains, at Pacific junction, the main line originally turned southwest, rejoined the Missouri at Marian, and followed that river to the Great Falls. There it united with the Montana Central, which continued in the Missouri valley to Helena, whence it crosses the main divide to reach Butte, Anaconda, and other important mining towns. These lie in an extraordinarily rich valley, between the two forks of the Rockies, the main watershed and the more imposing Bitter Root mountains.

When it was determined to make Puget sound the terminus, the main line continued west from Pacific junction. An easy route was discovered through Snake Head mountains, which alone afforded many engineering difficulties until the main range had to be passed. This it surmounted at Summit (elevation 5,202), and it threaded the apparently inextricable labyrinth of hills to the west of the main divide by following the windings of Missoula creek and the Kootenay river, the latter a large, roaring stream, whose banks and enclosing hills are heavily timbered, and which therefore bestows on the scenery a charm not possessed by any of the roads to the south. The Great Northern then turns southward towards Spokane and traverses the head of the great valley, here tapering towards its extinction. At Spokane it connects with and controls an important feeder from British Columbia, the Spokane and Northern railroad. After crossing the Cascade range, at an elevation of 3,375 feet, it runs down its western slope to a town of its own creation, Everett, on Puget sound.

This rapid sketch may be appropriately supplemented by tables of distances, and other statistics.

UNION AND CENTRAL PACIFIC.

	Miles.
San Francisco to Omaha	1,848
Omaha to New York	1,412
	3,260

SOUTHERN PACIFIC.

San Francisco to New Orleans	2,489
New Orleans to New York, by rail	1,373
	3,862
San Francisco to Galveston	2,176
San Pedro (port of Los Angeles) to New Orleans	2,031
San Pedro to Galveston	1,695

ATCHISON, TOPEKA AND SANTA FE.

	Miles.
San Diego to Chicago	2,391
Chicago to New York	912
	3,303
San Diego to Galveston	2,485

NORTHERN PACIFIC.

Seattle to St. Paul	1,913
St. Paul to New York	1,322
	3,235
Seattle to Duluth	1,936

GREAT NORTHERN.

Everett to St. Paul	1,796
St. Paul to New York	1,320
	3,116
Everett to West Superior	1,849

CANADIAN PACIFIC.

Vancouver to Montreal	2,904
Montreal to St. John, N. B.	481
	3,385
Vancouver to Port Arthur	1,913

The total mileage, owned and operated by the great roads we have described, is as follows:

TOTAL MILEAGE OF TRANSCONTINENTAL RAILROADS.

	Miles.
Union Pacific Kansas Pacific Oregon Short Line.	4,472
Southern Pacific company	7,129
Atchison, Topeka and Santa Fé, including Gulf, Colorado and Santa Fé, Southern California, and Santa Fé Pacific	10,270
Northern Pacific.	5,332

TOTAL MILEAGE OF TRANSCONTINENTAL RAILROADS.—Cont'd.

	Miles.
Great Northern	4,815
Canadian Pacific	7,748
Oregon Railroad and Navigation company	1,123
Denver and Rio Grande Rio Grande Western	2,765
Total	43,654

The amount of railroad capital represented by the transcontinental railroads under consideration reaches the stupendous figure of $2,080,506,000 as shown by the following table:

CAPITAL AND FUNDED DEBT OF TRANSCONTINENTAL LINES.

	Stocks.	Funded Debt.	Total.
Union Pacific and branches	208,333,000	187,257,000	395,590,000
Northern Pacific and branches	155,000,000	183,689,178	338,689,178
Southern Pacific and branches	180,000,000	138,870,321	318,870,321
Canadian Pacific and branches	117,000,000	116,163,107	233,163,107
Great Northern and branches	123,996,750	204,780,455	328,777,205
Atchison, Topeka and Santa Fé and branches	233,486,000	231,930,250	465,416,250
Total			2,080,506,061

Large as it is, this total is calculable; but the influence of the roads on the political, social, and economic history of the whole nation has been incalculably great. What more immediately interests us is, of course, the aid they have afforded to mining and metallurgy. Built as these roads have been across the arid zone, their influence on mining has been more conspicuous than on any other interest, but, on the other hand, the reciprocal influence of mining has been keenly experienced by the roads. The first mining interests to receive a stimulus were the lead mines of Utah and Nevada, on the completion of the Union and Central Pacific railroads. Shipments of the richer argentiferous lead ores preceded smelting up to the years 1872 and 1873, even as the shipments of the richer copper ores of Montana were made in advance of the advent of the Utah and Northern railroad into Butte. But not until the metallurgist came to the assistance of the miner, and the railroads supplied moderately cheap fuel, did the west become the controlling factor, which she is to-day, in the world's production of copper and silver.

The beginnings of gold and silver mining in the eastern range of Colorado antedate the arrival of the railroad; but only when the Union Pacific system reached Denver could the sulphurets of Gilpin county be smelted into mattes, or the refractory ores of Clear Creek county be advantageously treated.

The discovery of Leadville and the active development of both mining and metallurgy in that direction were the most potent agents in stimulating railroad building, the exploitation of coal mines, and the manufacture of coke in Colorado. New Mexico and Wyoming both supply ore to the Pueblo, Col., iron and steel works. There is coal in the Durango district of Colorado, and south of the line in northern New Mexico, but it is as yet not as accessible as fuel from the coal beds of the Raton range, both in Colorado and New Mexico. These afford the most available supply of fuel for both the locomotives and furnaces of the southwest. The statistics of 1903 give the production of coal in Colorado as 7,651,694 tons; of coke in Colorado as 1,053,840 tons; and of coal in New Mexico, 1,323,909 tons. The Wyoming coal mines are credited with 4,602,929 tons. Montana's coal production has reached 1,500,000 tons, and the coal is of a quality which relieves the smelters from drawing any longer a notable supply from the Canadian northwest. Washington, even, contributes over 3,000,000 tons to the ever growing demand. Thus these western coal areas, so recently opened, contribute to the total of the country's fuel requirements over 17,000,000 tons, or over 6 per cent of the country's total production of bituminous coal.

Copper has been, after coal, the most essential auxiliary of all of the mining products to the western railroads. Its bulk and the large proportion of fuel consumed in the reduction of its ores have made it one of the most valuable items of western freight. At the same time the copper industry owes its origin and growth entirely to transportation facilities.

Though the Longfellow mine in Arizona smelted small quantities of ore with wood or charcoal, and shipped small quantities of copper for 700 miles to the nearest railroad station on teams which had brought merchandise into the valley of the Rio Grande, only the exceptionally high price of copper in the seventies permitted this. It was not until the Southern Pacific from the west, and the Atchison, Topeka and Santa Fé from the north, made a junction at Deming, that the Bisbee, Clifton, and Globe districts became notable producers. So also, though small quantities of rich argentiferous ores were shipped from Butte to Corinne, on the Central Pacific, before the Utah and Northern was built, Butte did not rise into prominence as a copper producer until that road had reached Silver Bow county in Montana. Now, the copper industry of Montana must supply the railroads directly and indirectly with about 1,250,000 tons of long haul freight, and about 2,000,000 tons of short haul freight; and the Arizona copper industry gives them more than 750,000 tons of long haul freight, as for every ton of copper made more than thirteen tons of fuel, lumber, and general supplies and merchandise are carried for the mines, works, and workmen. If the trade of the Pacific were always to be from west to east, there would be a superfluity of transportation facilities; but the current is sure to turn, and ere long there will be a heavy freight traffic to Pacific ports.

The Pacific railroads have, to all intents and purposes, doubled the area of this country and Canada, and they have done it in the short period of thirty years. A region 1,000 miles wide by 2,000 long, rich in minerals, and utterly virgin ground, was scoured. It is practically bare of soil and unconcealed by forest, and therefore exploration has been easy and discovery rapid; but hardly more rapid than the avidity with which the discoveries, once made, have been utilized. The statistics of the precious metals mined since 1849 afford proof of this. Between that date and the present the Rocky mountains have yielded about $4,700,000,000 in gold and silver. The Comstock lode alone produced from 1860 to 1880 $306,000,000 in gold and silver. It is worthy of note that the stocks and bonds which may be presumed to represent the construction and equipment of the 43,000 miles of railroad in the Rocky mountain system represent in volume about 45 per cent of the total production of the precious metals recovered from the west.

But the men themselves have had almost as powerful an influence on the world's history as the production of their hands and brains has had on the world's markets. The isolated outdoor life passed by the herdsmen, prospectors, miners and ranchers of the Rocky mountains and the Pacific slope, far from the restraints of society, has created a race which acts under very different impulses from those which kept the New England and Virginia colonists content with their narrow home between the Atlantic and the Alleghenies. And the self-assertive, though generous, spirit of the pioneer, who is untrammelled by precedent or prejudice, has communicated itself to the mercantile and technical classes of the west, and thus has helped, not a little, in fostering its extraordinary rapid growth. These men of the west are the real coureurs de bois of our day, and acts of congress would be as powerless to restrain them as were the édits et ordonnances of the French governors to check the roving habits of their predecessors. Wherever there is a new country to explore, if it contains minerals, these are the men to explore it. Let there be a great gold discovery in arctic or tropic regions, in the Klondike, or in central Africa or New Guinea, and a contingent will start from the Rockies by the earliest train to catch the first steamer, with no baggage but its blankets—and the expedition will reach its goal, wherever that may be.

After this imperfect survey of what has been done since 1862 in railroad building west of the Missouri, and in the pioneer industries which have followed close upon the locomotive, founding a new empire on the Pacific slope, I think that, whether or not the proposition be accepted, with which I began, that our worthy ancestors on the Atlantic coast were somewhat lacking in the spirit of adventure, it must be allowed that our eastern contemporaries are not deficient in courage and enterprise.

RAILWAY REGULATION.

BY ROBERT M. LA FOLLETTE.

[Robert Marion La Follette, senator from Wisconsin; born June 14, 1855, at Primrose, Wisconsin; graduated from the University of Wisconsin in 1879; was admitted to the bar in 1880, and the same year was made district attorney for Dane county; seven years later he was elected to congress and was distinguished for the part he took in framing the McKinley bill; in 1901 he was elected governor of Wisconsin; senator in 1905; noted for his fight for direct primaries and other reforms.]

To meet and wisely discharge the responsibility of regulating commerce, state and interstate; to bring railways back and hold them to their legitimate business as common carriers, is the most important work in the government of this republic for this generation of man.

If the great railway corporations of the country are using their unlimited power without abusing it, if they are transporting the commerce of the country at reasonable rates, with fairness to the general public, with a just regard to the rights of individuals, and without favoritism to places and persons, then they might justly regard government control and regulation as unnecessary and meddlesome interference.

If, however, the public is suffering serious wrong, if there are far reaching abuses in the transportation of its commerce, if the railway companies are not only carrying the commerce of the country but controlling the commerce of the country, determining where it shall be massed, where the markets shall be located, and their control; if they are discriminating in favor of the large shipper, creating and fostering industrial and commercial monoply, then there rests upon the several state legislatures and upon congress an obligation to act, and to act at once, with all the determination and patriotism commensurate with the duty to preserve government itself.

Capital and labor wherever employed in the creation of wealth,—whether in mining, or in manufacturing, or in agriculture,—in short, material production, in every field of human activity, is absolutely dependent upon transportation.

It is not more vital to production, upon a basis attaining to the upbuilding of any community or section of the country, that lines of transportation should be established than that, when established, the service shall be adequate, just in rate, and free from discrimination. That business, town or section which is denied the opportunity to move its products to markets at fair rates and upon an even footing with a competing business, town or section, must inevitably suffer great loss, and, in the end, be forced out of the unequal contest. Therefore, the general growth and prosperity of every community, the interests of producer and consumer alike, depend upon these three factors in transportation: the service must be adequate; it must be reasonable in cost; it must be impartially rendered with respect to each individual and every business, town or section.

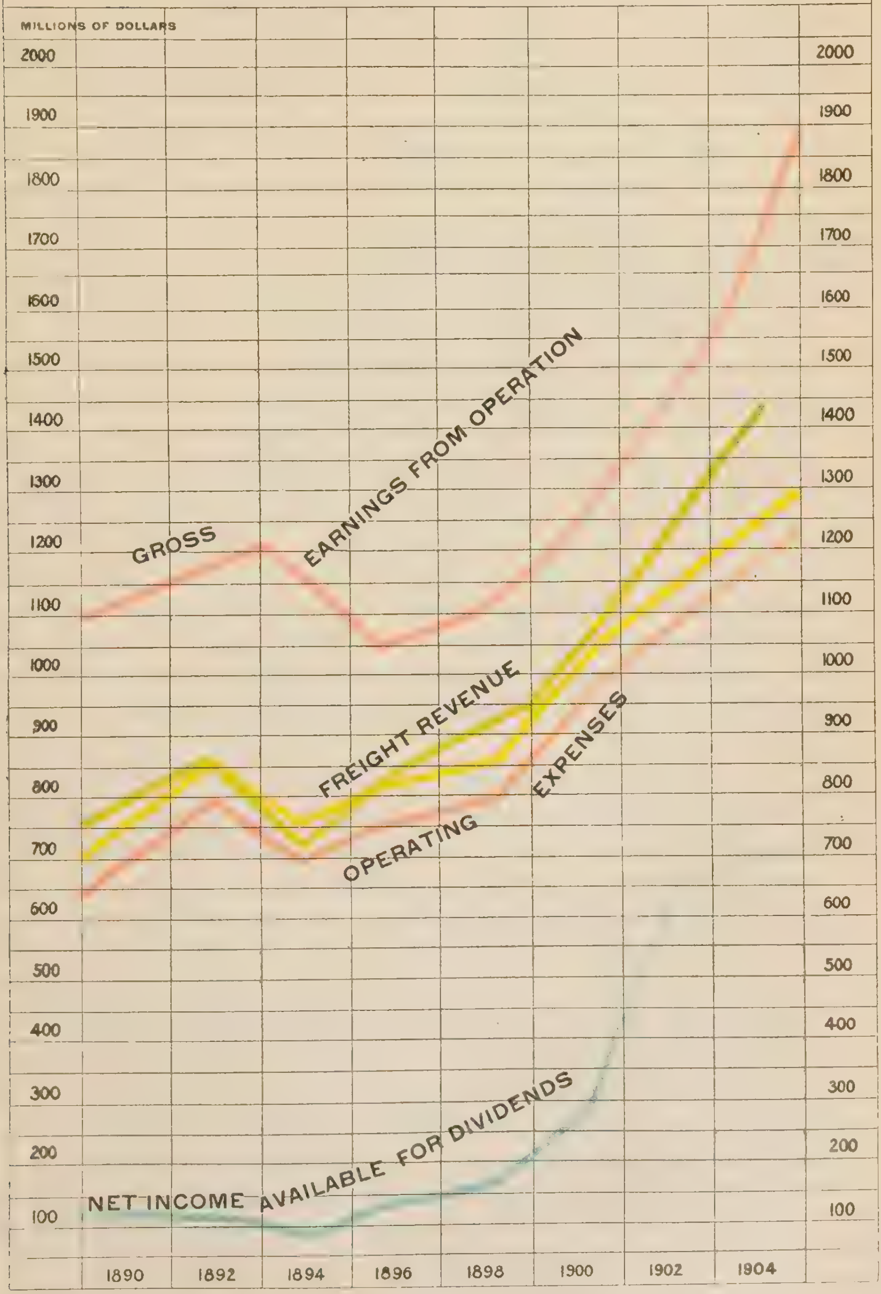
The founders of this republic recognized the importance of establishing lines of transportation and of insuring a basis of equality for each community in its exchange of products with every other. They ordained that commerce between the states should be free and untrammeled. The state, as well as the nation, aided in the construction of roads and canals, and since 1800 the federal government has supported by taxation a system of river and harbor improvements upon which there has been expended more than one hundred and seventy five millions of dollars in the last seven years alone. Added to this, nearly one half of the states invested large sums of money in the construction of railroads, and town and county aid in the several states throughout the country, aggregating many hundred millions of dollars, was contributed for like purposes, while state and national governments granted out of the public lands enough, in aid of railroad construction, to equal in area the states of Ohio, Indiana, Illinois, Missouri, Iowa and Wisconsin. All that has been invested by towns, counties and states in turnpikes, all that has been expended in building locks and dams and canals and in broadening and deepening rivers and harbors by the federal government for more than a century, together with the vast sums of money donated by municipalities and states, and the lands granted by state and national governments for the construction of railroads, which are now a part of the great systems of the country,—has been paid out of the public purse and carved out of the public domain. Every dollar of the money and every acre of the land was the property of the people, and, independent of all else, each citizen, however, humble, ought of right to stand upon an equal footing with every other citizen respecting transportation. Furthermore, the state creates the railway corporation and bestows upon it special powers and special privileges without which it could not establish and maintain its lines or build up its business.

The state invested the transportation company with one of the greatest powers which the state possesses,—the right to take private property without the consent of the owner. This grant of power is made, not as a matter of favor to the corporation, but the better to enable it to discharge its duties to the public. It can be justified upon no other ground. As stated by the United States supreme court:

"The state would have no power to grant the right of appropriation unless the use to which the land was to be put was a public one. Taking land for railroad purposes is a taking for a public purpose, and the fact that it is taken for a public purpose is the sole justification for taking it at all."

The grant of these powers and privileges to the railroad corporation in itself establishes the character of the transportation business, and identifies it as a function of government. It would be obnoxious to every just principle upon which government is founded to charter railway companies, give them the right of eminent domain, authorize the bonding of towns and counties, and grant to them large areas of the public lands, if they were to be permitted to conduct a business so established upon any other basis than that of absolute and exact justice to each individual and to every interest. The only principle upon which government can grant such powers and privileges, and bestow public aid upon railroad corporations, is that they are maintaining public highways over which they must serve the public efficiently, reasonably and impartially. To require full and exact performance of this public duty from the rail-

EARNINGS AND OPERATIVE EXPENSES OF AMERICAN RAILROADS



way corporations is not only the absolute right, but it is the bounden duty, of both state and national governments.

Under our form of government, federal and state, a division of powers and responsibilities with respect to transportation and the protection of the commerce of the people, was fixed by constitutional limitation. Commerce is either state commerce or interstate commerce. A shipment originating and ending within a state is state commerce, or state transportation. With respect to such a shipment the national government can exercise no authority or control whatever. Commerce of this character is purely a subject of domestic concern for the state. If the shipper is to be protected in his right to an efficient service at a reasonable rate, without discrimination in any respect, it must be by state government alone.

On the other hand, a shipment originating in one state and ending in another state is, throughout its whole course, interstate commerce. This is true with respect to the shipment from the time it begins to move from the point or origin until it reaches its destination. With respect to such a shipment the state has no authority and can afford the shipper no relief from any injustice suffered because of the failure of the railway company to discharge properly its public duty. Such redress must come from the federal government, to which the state has delegated its right to regulate commerce among the several states.

For more than a generation of time it has been the settled law of this country that the state, through its legislature, may control railway services and railway rates as to state commerce, and that the national government, through congress, may control railway services and railway rates with respect to interstate commerce.

In recognition of this right, several of the states have established such commissions for the control of railway services and rates within the state. With a view of protecting the public in all its transportation extending beyond the borders of the state, congress enacted the interstate commerce law in 1887.

Any review or consideration of government regulation of railway transportation must deal with state and federal regulation, in a measure, independently.

The states were years in advance of the nation in moving for a control of railway services and railway rates. As Wisconsin, Illinois, Iowa and Minnesota led in broadly asserting the right of the state legislature to control transportation rates and services, a consideration of the results attained in these states is important and necessary to an intelligent understanding of the whole subject.

In the early seventies these states enacted legislation for the regulation of railroad transportation. The legislation was then designated, and will for all time be known, as granger legislation. The granger statutes were at that time and have ever since been violently denounced as radical, revolutionary, and a hindrance to the development and prosperity of the country. And yet the granger legislation in those four states of the old northwest was simply a protest of a conservative and law-abiding people in the name of the law, against a railroad management which violated the rights of individuals without pretense of excuse or justification. Mr. A. B. Stickney, president of the Chicago Great Western railroad, in his work on The Railway Problem thus presents some of the causes leading up to the granger legislation:

"It will not be difficult when the conditions existing at the beginning of granger agitation come to be examined, to see that railway traffic was then being conducted in such a manner as to destroy a portion of the value of the property of large numbers of individuals, and the whole value of the property of certain other classes. Startling as the bald statement must naturally be, those conditions were then admitted to exist, and continue now, to a more limited extent. . . . As soon as they came to realize by sad experience the enormous power which discrimination in the matter of rates conferred upon the managers of railways (who, after all, are but human) in respect to the private business of individuals, it could not be expected that a free people would tamely submit to it. . . . This unrestricted power to discriminate in the matter of rates lodged in the hands of one man, the manager of say five thousand miles of railway; the power through malice, ignorance, or stupidity, to decree which out of say a thousand cities and villages located on his lines should prosper and which should not; which individual out of say ten thousand merchants doing business in those cities and villages should make a profit or a loss. . . Such enormous power over the fortunes of so many should never be lodged in the hands of any one human being."

Speaking further on this subject, and of the attitude of railroad presidents and managers, in opposition to control, President Stickney says:

"The companies at first denied that they were common carriers or subject to the duties or restrictions imposed upon such carriers by the common law. Upon these premises, and as they supposed in the interests of their companies, the managers claimed the right to charge such rates for transporting private persons and property as they deemed for the best interests of their respective companies, regardless of their reasonableness or equality.

"They claimed and exercised the right to grant monopolies in business to favored individuals and firms—for example, one man or firm would be granted the exclusive privilege of buying all the wheat or corn, or selling all the fuel, wood and coal; by exercise of their power to discriminate in regard to rates and combinations, they were enabled to enforce these grants of exclusive privileges with a certainty never before pertaining to such grants.

"They assumed the right to dictate to communities in what market town they should sell their produce and buy their supplies. Thus, a community located forty miles distant from St. Paul and four hundred miles distant from Chicago was compelled to trade in Chicago, so as to give the railway the long haul, and in order to force this dictation they did not hesitate to make the rate for forty miles as much as, or more, than for four hundred miles.

"They believed they had the right so to make their schedule of rates as to determine which of the villages on their line should become centers of trade beyond their local territory.

"They also varied their schedules in such a way that they discriminated in regard to rates between individual merchants, manufacturers, miners, and other business men, so as practically to determine which should become prosperous and wealthy and which should not.

"This class of discrimination was all the more pernicious because done in secret."

The granger statutes were far from perfect, especially in respect to provisions for their enforcement. But they were essentially correct in principle and reasonable in their terms, so far as the railroads were concerned, and in so far as they sought to regulate services and rates between the public and the public service corporations. They were in no sense an unwarranted and irrational interference with the laws of trade and economic conditions. They simply applied a principle as old as the common law. They were enacted with the purpose of enforcing just and equitable rates to individuals and communities. They expressed in legislation an effort to escape from that arbitrary and tyrannical control on the part of common carriers so frankly described by President Stickney in the foregoing quotation.

This was the first great struggle between the railroads and the public to determine which should be master. It was a battle royal, and established as the law of this country the right of the people through legislation to regulate transportation charges upon the railroads of the land.

The ability with which the railroads conducted their opposition to the granger legislation is interesting and instructive at this time. It was an indication of their sincerity and a measure of the value of their representations with respect to disaster to the railway business and the industrial interests of the country, which they assert is certain to follow the legislation now proposed in some of the states for state regulation, and in congress for an enlargement of the powers of the interstate commerce commission, as demanded by the people, and suggested by the president in his recent message to congress.

Upon the enactment of the granger laws, harrowing accounts of railroad construction at a standstill, of the collapse of railroad business, the spoliation and ruin of railway property, and the checking of all development in the granger states were published and republished as the dire and awful consequences following as a logical result of that legislation.

Already the railway lobby assembled at Washington and in the different states is, at the present time, uttering the same warning cry of distress, through such papers and periodicals as reflect the will of railway managers. This is designed to admonish all men and all interests of the train of evils sure to result, should the railroads be disturbed at this time in their authority to dictate to the people the terms on which its business shall be transacted with them.

From the enactment of the law in Wisconsin until its repeal, two years later, when the railroads regained control of the legislature, and long after, the highest talent which money could command was employed in assailing the Wisconsin law, and the laws passed in Illinois, Iowa and Minnesota, as well, and in misrepresenting the effect of the legislation upon railway and all other business within the state, Reports as to the financial condition of the roads were suppressed or destroyed, and the corporations caused to be published broadcast that not only had their business fallen off, but that they had been obliged to suspend all construction and improvements, and that even maintenance of existing lines was threatened, while the railroad business, and all other business dependent upon it, was prostrate and languishing in consequence of the legislation which violated all the laws of trade.

Even economic writers of eminence and fairness of purpose, accepting the railroad figures then put forth and the railroad conditions then reported by the companies, were misled into partisan and violent denunciation of granger legislation. In all of the criticism and attack made at the time, and since, it seems almost incredible that no independent investigation should have been made by any of the writers dealing with this subject. This is especially true of those whose criticisms should have been based upon thoroughgoing and critical study, in conformity with the character of the work then and afterwards turned out by them as authors and writers upon economic subjects. Strangely enough, it is manifest that their argument was based upon false premises furnished, and misleading statements published, by the interested railroad authorities. In so far as my research extends, I have been unable to find that any one of them ever made an independent, critical analysis of the facts involved.

Notwithstanding all that has been written and the authorities which may be quoted to the contrary, I venture here to declare that, in so far as the granger laws were enforced in either of the four states, they were helpful and not harmful to the interests of the state and of its citizens and of the railway companies as well.

In answer to the claim that railway construction at once came to a standstill and all work on projected lines at once ceased, I submit the following comparison of the railroad mileage in Wisconsin, Illinois, Iowa and Minnesota,—the granger states,—with Michigan, Indiana, Missouri and Nebraska, four states which had reached about the same stage of development as the granger states, which were similarly situated as to population and general industrial conditions, and which lay wholly outside the field of, and were not affected by, the so-called granger legislation. These states are selected for comparison and consideration only after reaching the conclusion that the conditions prevailing in each at the time were such as to render the comparison just and fair. In order, however, to broaden and verify the comparison, I have included as another group the middle Atlantic states, namely: New York, New Jersey, Pennsylvania, Delaware, Maryland and West Virginia; also the Southern states, Kentucky, North Carolina, Tennessee, South Carolina, Georgia, Florida, Alabama and Mississippi; and finally broadened that comparison to include railroad mileage of all the states of the union for the years 1871, 1872, 1875 and 1880. The figures were obtained from the various state reports and from Poor's Manual.

Number of Miles of Railroad.

Years	Wisconsin	Wisconsin Illinois Iowa Minnesota	Michigan Indiana Missouri Nebraska	Middle Atlantic States	Southern States	United States
1871	1,725	12,401	9,168	12,030	12,013	60,293
1873	2,360	14,627	10,932	13,643	12,977	70,278
1875	2,566	15,515	11,381	14,455	13,287	74,096
1880	3,130	19,428	14,396	15,949	14,908	93,671

The Wisconsin law was enacted in the early part of 1874 and repealed in 1876. The other granger laws were enacted,—

Minnesota in 1871; Illinois in 1873, and Iowa in 1874. By 1875 it may fairly be assumed that the effect of these laws was most pronounced in all of the granger states. The figures presented show that Wisconsin and the other granger states held their own in railroad construction as compared with the four surrounding northwestern states, the middle Atlantic states, the southern states, and the total railroad mileage of the United States. Indeed, the granger states did better than the others. They show a greater increase than the neighboring states, with which they may certainly very properly be compared. They also show a greater increase than both the middle and southern states, and a relatively greater increase than the country as a whole. If we take the mileage for 1873, the year which immediately preceded the legislation in Wisconsin, and compare it with the railroad mileage in 1875, the last year of the granger period in Wisconsin, we will find the following per cent of increase: Wisconsin alone, 9 per cent; the four granger states, including Wisconsin, 6.1 per cent; the four adjoining states, 4.1 per cent; the Atlantic states, 5.9 per cent; southern states, 2.4 per cent; and the United States, as a whole, 5.5 per cent.

It was charged that the railroad industry was prostrated by this legislation. Examine the railroad earnings of these years. I am not able to procure data for the gross earnings of the railroads in Minnesota or Nebraska covering this period of time. For this reason those states are omitted in this comparison, the figures for which were also obtained from the various state reports and from Poor's Manual.

Total Gross Earnings in 1871–73–75 and 1880.

Years	Wisconsin Illinois Iowa	Michigan Indiana Missouri	Middle Atlantic States	Southern States	United States
1871	$54,994,114	$44,433,246	$147,130,494	$41,772,102	$403,329,208
1873	70,027,777	59,106,865	194,052,302	53,696,409	526,419,935
1875	69,621,065	54,731,069	175,677,418	50,399,227	503,065,505
1880	86,954,346	79,038,920	199,003,718	48,317,754	615,401,931

This table discloses additional matter of great importance to this discussion. We find that the gross earnings decreased in the granger states during the period covered by the granger legislation,—that is, from 1873 to and including 1875 (the time when the Wisconsin law was in force).

For the three granger states, however, this was in the trifling amount of four hundred and six thousand dollars. For the three granger states, Wisconsin, Illinois and Iowa, the decrease did not exceed one half of one per cent. For the adjoining states the decrease for exactly the same period of time amounted to four million, three hundred and seventy five thousand, seven hundred and ninety six dollars, or to 7.5 per cent. The middle states show a decrease in gross earnings of 9.5 per cent; the southern states, 6.1 per cent; the whole country, 4.4 per cent.

If the granger legislation was responsible for this condition of things, then its operation was singular indeed. In the states where granger legislation had been enacted, there was no appreciable decline in gross earnings.

In other states, where no such laws were in force, the decline in gross earnings was great; in fact, the shrinkage was from ten to twenty times as great as in the granger states.

The showing on net earnings is equally significant. For the three granger states from '73 to '75, there was a substantial increase. In the adjoining states, however, there was a decline in net earnings amounting to three per cent.

Whatever depression existed in the granger states during this period was not due to legislation, but to the financial crisis and panic of 1873. The financial distress which followed was very severe; in fact, the depression was the greatest in the history of the country. It began with a panic in the money and stock markets and spread to every operation in finance and commerce. The depression which followed continued in most branches of business until the end of 1878.

When all of the facts in the case are thus brought to light, when we examine it from every side, the granger legislation takes on a different aspect from that in which it has been made to appear for the last thirty years. The granger laws neither stopped railroad building nor reduced railroad earnings. Had the railroads met this legislation in the spirit in which it was enacted, discontinued their discriminations and adjusted their rates to the new basis, their revenues would have been increased under the law. Instead, they made it their special business, and employed others, to attack the grangers and granger legislation violently and persistently year after year. They made the granger legislation responsible for every misfortune that befell the roads. They made it serve as a shield for their own mistakes and shortcomings. Although their invectives have become well worn and stale, they are still employed against legislation designed to control railway transportation.

Securing control of the legislature in 1876, as before stated, the railroad companies repealed the Wisconsin law. They enacted in this state a statute providing for one railroad commissioner, with very limited functions, as stated by Professor Emery Johnson in his recent work on American Railway Transportation.

The same campaign in Minnesota resulted in a repeal of her law a year after its passage, and the adoption of a law instead providing for only one commissioner, with little more than supervisory power. In Minnesota this law remained in force for a decade, when a stronger law was enacted.

Iowa's law continued in force until 1878, when a commission was created with limited powers. This statute was again superseded in 1888 by her present law, establishing a commission with power to prescribe rates.

The Illinois statute of 1871 prescribed maximum rates and fares, prohibiting discriminations and establishing a commission to supervise railways and assist in enforcing the laws for their regulation. In 1873 the law was adopted in Illinois making it the duty of the commission to prescribe a schedule of reasonable maximum rates for the transportation of passengers and freight.

It will thus be observed that Iowa and Illinois not only maintained the ground gained by the granger legislation, but extended it and fortified it from time to time, while Wisconsin again came under the dominion of the railway companies. In these three states, lying side by side, the opportunity is therefore presented to apply the tests of comparison to the two systems, namely, where the states have assumed and exercised authority in regulating rates, and where rates are fixed by the railroads without state control. A critical study of these two systems has been of material aid in clearly defining the issue with respect to this important question in Wisconsin.

For years it has been known in a general way that the people of this state were at a great disadvantage. Session after session attempts have been made to again secure legislation for railway control and regulation. The railroads have, however, been strong enough to defeat all such measures. Two years ago the results of painstaking investigation of transportation charges in Wisconsin, in comparison with the rates fixed by the state commissions of Iowa and Illinois, were presented and discussed in the executive message at the opening of the legislature. This was the first time in more than a quarter of a century that the subject had been treated in executive message. Later in the session a special message reviewed the entire rate situation in Wisconsin, Illinois and Iowa, and recommended the enactment of a law creating a commission, with authority to control services and rates.

In any comparison with Illinois and Iowa rates it can be taken as conclusive that the transportation charges in Illinois and Iowa are high enough to give the railroad companies at least a reasonable profit upon the railroad business in each of those states. If the rates afforded the railroads less than a reasonable profit, they would at once appeal to the courts to increase the rates. It is the settled law that neither the legislature nor a commission created by it, with power to fix rates, can compel a railway company to accept less than a reasonably profitable rate. Therefore by acquiescing in the commission rate in Iowa and Illinois without appealing to the courts, the railroads admit the rates to be high enough in those states.

The facts submitted to the Wisconsin legislature demonstrated that the producers and consumers of this state were paying freight charges at that time ranging on the average from twenty to nearly seventy per cent in excess of the rates paid by Illinois and Iowa for identically the same service.

A bill was introduced, providing for the creation of a commission with power to regulate railway service. The methods employed by the railways in opposition to this legislation are not without interest. The attorneys of the railroads and their lobby agents, in opposing this bill before the legislative committee, asserted that there was no discrimination in freight charges against the people of this state, as compared with those of the adjoining states. They declared that freight rates in Wisconsin were just and reasonable; that there was no favoritism shown shippers, and denied the payment of rebates. The legislative lobby was reinforced by many large shippers brought to the capital upon free transportation, furnished by the railway companies. Some of these shippers came willingly, because they were the recipients of rebates and transportation favors denied to the public. Some small shippers who favored state control of railway rates came to oppose the bill before the legislative committee, as they informed me, because they did not dare refuse, when called upon by the railway companies. In either case, their presence was the strongest proof of the power which the railroads exercise wherever they have control of transportation. This opposition of the large shippers, joined with that of the regular railway lobby, employing its usual methods, secured the defeat of the commission bill in the legislature of 1903.

The people of the state were too much interested and too thoroughly aroused to permit the matter to be disposed of in any such manner. The control of railway services and railway rates became the paramount issue. The corporations were alarmed; and although they had declared their rates to be just and reasonable when before the legislature of 1903, in the midst of the campaign which followed they reduced Wisconsin rates from time to time upon such commodities as would best serve in the exigencies of the campaign. Instead of mollifying the people of the state, however, this action upon their part simply furnished evidence of the fact that they had been for years imposing excessive rates upon Wisconsin traffic.

An investigation of the differences existing in 1905 between rates in Iowa and Illinois and rates in Wisconsin established the following:

The average Wisconsin rates on merchandise are nearly thirty per cent higher than in Iowa for the same service. The average rates upon grain in Wisconsin are over thirty per cent higher than in Iowa and Illinois for like services. The average rates on live stock are nearly twenty four per cent higher than in Iowa and Illinois for identically the same service. If further testimony were required to show the necessity of protection in any state against rate making on the part of the railroads without state control, it is furnished by the records which the railroads themselves issue to their stockholders respecting their earnings in Wisconsin.

The net earnings of the Chicago, Milwaukee and St. Paul railway company are eleven hundred and nine dollars per mile greater upon its Wisconsin mileage than for the other states through which its lines extend. The net earnings upon this road in Wisconsin in 1904 were equal to six per cent on a valuation of one hundred and ten million, two hundred and sixteen thousand dollars on its entire mileage in the state.

Under Wisconsin's new law for taxing railroads, the tax commission, acting as a state board of assessment but a few months ago, assessed the value of this company's road in Wisconsin at seventy million, two hundred thousand dollars. The representatives of the railway company appeared before the commission, and protested against this assessment as too high, yet they levy a transportation tax upon Wisconsin people which produces a six per cent income upon a valuation of the same property of about forty million dollars in excess of the valuation fixed by the tax commission.

The Chicago and Northwestern railway company reports eleven hundred and thirty eight dollars higher net earnings for every mile of road in Wisconsin than it reports per mile upon its road in the other states through which its lines extend. The net earnings of the Northwestern upon its total mileage in this state amount to six per cent on one hundred and twelve million, twenty three thousand, three hundred and sixteen dollars. The recent assessment of this road in Wisconsin by the tax commission fixes its value at seventy one million, five hundred thousand dollars, or forty million, five hundred twenty three thousand, three hundred sixteen dollars less than the amount upon which the company compels the people of Wisconsin to pay six per cent annual income. And yet the Chicago and Northwestern, the Chicago, Milwaukee and St. Paul, and other leading roads of Wisconsin have joined in a suit to set aside the assessment of their property as excessive.

At a very early period in the history of the state the railroads had secured the enactment of a law by the provisions of which they paid in lieu of all taxes a license fee upon their gross earnings. This law required a sworn statement to be filed by each railroad company of their gross earnings in Wisconsin for the year. Upon this amount so filed, they were required by the terms of the law to pay a four per cent license fee. For some time doubts had been entertained as to whether the railway companies were reporting for taxation the full amount of their gross earnings. An investigation of the railway companies' books and accounts was therefore instituted. This investigation disclosed that the railroad companies had been systematically paying rebates to favored shippers for years. The sums so paid, in violation of the federal statutes, were very large, amounting in the aggregate to several millions of dollars.

It is therefore established beyond dispute by the investigations which have been made respecting rates, rebates, discriminations and inequalities:

That Wisconsin rates are higher than rates charged under substantially similar conditions in the neighboring states of Iowa and Illinois.

That rates charged in Wisconsin on the whole yield a net income to Wisconsin railroads greatly above the amount required for operating expenses, maintenance of property, and a fair profit on the cost of the roads.

That the railway companies are guilty of gross discriminations between persons and places in this state.

If any question could be definitely settled, the people of Wisconsin in the election of 1904 declared for the establishment of a commission to control railway services and railway rates on state commerce.

The discussion of this issue was demanded in every part of the state. It was thoroughly understood and passed upon in senate and assembly districts, and the Wisconsin legislature of 1905, obeying the instructions of their constituents, wrote upon the statute books a law for a mandatory commission.

The same conditions which prevail in Wisconsin with respect to excessive transportation charges and discriminations in service, both as to individuals and places, prevail in every other state in the union, where the railway companies control; and each state owes it to the citizen to secure an efficient and impartial service at reasonable rates upon all state commerce.

I believe there would have been a much more insistent and determined demand for state regulation if the railroad companies had not succeeded in breaking down and nullifying the interstate commerce law. There has been on the part of the corporations a studied effort to work into the public mind a belief that the subject was too complicated and intricate for legislation; that the relation of transportation to the business interests of the country were so involved, complex and delicate that public officials, representing the state or national government, could not be trusted to approach it, much less be clothed with authority respecting its regulation. The traffic departments of railway systems have been surrounded with vagueness and mystery. In deference to the insistence here and there manifesting itself for some relief, there comes from time to time a clever intimation that tribunals might be created to hear complaints and make suggestions. But even legislation so limited, it has been urged, should be deferred for further and more matured consideration, lest the great interests might be prejudiced and incalculable harm result.

The fact that favoritism, partiality and discriminations with respect to communities, cities, industries and individuals are ruining business and retarding development and growth locally in many sections of every state, the fact that rates are continually advanced, that capitalization of many railway corporations is undergoing marked inflation from time to time, and that, in consequence, the people's business is suffering and many individuals being crowded out, seems to weigh for very little. The fact that the railroads are becoming associated with great business interests inconsistent with rendering impartial service to the general public, and are the most potent factors in building up trusts and monopolies menacing to republican institutions, counts for nothing against this specious plea for non interference.

It is further urged by those seeking delay that the subject is one which should be uniformly treated, that the state should wait on congress and congress should wait on the states. It is time that the country awakened from its lethargy. Uniformity in legislation respecting the control of railway services and railway rates would be very desirable. So would uniform divorce laws, uniform banking and insurance laws, and uniformity upon many lines of legislation. But because constitutional limitations bar the way for speedy and prompt legislation, uniform in character, it does not lessen the obligation of state government to deal with existing evils in the best way possible according to the powers which it possesses. I believe that it will be a decided gain and a truly progressive step in the practical solution of the problem for a regulation of state and interstate commerce if the state proceeds to do that which is clearly within its power. If each state will establish a just and equitable regulation of rates and railway service as applied to state commerce, it will greatly simplify this subject, bringing it home to each community and making it a part of the thought of the people of each state. The duty of regulation and the specific method to be employed will then be more easily and definitely understood.

The development of all the state's resources, the diversification and interdependence of its industry, and the ready and free exchange of its commodities with an even, well distributed growth in towns and centers of population are all natural objects of special care on the part of a state railway commission. It is true that the boundaries of a state are not the boundaries of its commerce, although there are always natural tendencies to commercial centers within the state. While it is also true in a qualified sense, as contended by the railroad advocates of non-interference, that they are interested in the development of the resources of the state in order to increase their business, it is likewise true that their interests are far from identical with those of the state. It is of the highest importance to the state that there should be many thrifty towns and cities of moderate size well distributed over it. It best serves the interest of the railway company that the products of the state should be carried by the long haul to remote markets. And it should always be remembered that the railways make artificial and arbitrary regulations with respect to where trade and commerce shall center, and that such regulations are made, not with a view to the best development of every part of the state upon the broadest social and economic grounds, but, instead, that which will make the best financial showing to place before the board of directors at the end of the year. The same reasons which may be urged for the better protection of domestic interests in other respects through state government hold good for the state control of railway transportation. Independent of the large field of local work for state commissions, their establishment might be urged as one of the best expedients for securing early, definite and satisfactory action on the part of congress for proper control of interstate commerce. The proposed question, perhaps, could be presented in more concrete form as a state rather than as a national issue; and when once the issue has been clearly defined with respect to the one, it is easily carried over and applied with respect to the other. Definite, specific results in legislation at the state capital will bring like results at the national capital. Prompt action is needed in every state where legislation is either wholly wanting or weak in character. Neither should there be any relaxation of effort to secure effective regulation of interstate commerce. The granger agitation of the old northwest states was followed by the determined effort to secure national legislation. To-day there is a demand for state and national action to bring public service corporations within reasonable control. Organization should be made in every state for coördinate action on this important problem. There must be no delay with respect to either. Action means advancement in the right direction. A grave situation confronts the people, calling for wise and enlightened consideration, but calling for action promptly.

Certain fundamental principles are established. The right of the state to act is clear. Comparisons in rates between states where the railroads control on the one hand and where the state controls on the other, show conclusively that government regulation gives decided advantages to the people of those states having commissions, even where the laws are far from perfect, or where the railroads have come to exercise some influence over the action of the commission. The experience in every state where legislation has been secured, or where an attempt has been made to secure it, has been helpful in every other state, and in the nation as well.

Some very important questions with respect to the scope of a state law and of the powers with which a state commission should be invested have been well and definitely settled by experience.

An investigation of the laws of the states which have been successful in creating effective commissions for the control of transportation, offers valuable suggestions and conclusions as to the powers and duties with which they should be vested for the highest services in the public interest.

The following are some of the more important provisions which the result of my research led me recently to recommend much more at length to the consideration of the Wisconsin legislature, in their work of framing a law for the state.

A reasonably good service is quite as important as a reasonable cost of service. I believe a commission should be invested with power to enforce adequate and efficient service for the patrons of railroads, always taking into consideration the circumstances and conditions with respect to the towns, cities and sections of the state concerned. In furtherance of this provision, the commission should have authority to require, in the interests of the traveling public, whenever the action of the corporation makes it necessary, proper station accommodations, adequate train service and reasonable connections with other lines. They should be empowered to require the furnishing of cars for the reasonable accommodation of shippers, to the end that they may not suffer unnecessary delay and loss in reaching market. The commission should have power to require reasonable facilities for ascertaining the weight of loaded cars, thus preventing overcharge and delays in settlement of claims. They should, in short, be able in all important matters to insure protection to the public from the tyranny and abuse of power on the part of the transportation company.

State commissions should have full authority to revise rates and to issue orders carrying them into immediate effect If the commission has power to fix maximum rates only, the railway companies can still unjustly discriminate between shippers by making special rates below the maximum rates. A slight variation is sufficient to ultimately consolidate business in the hands of the favored shippers. If the rate made by the commission does not go into effect at once upon the order of the commission, the railroad company can destroy the value of the rate making power by litigation which would indefinitely postpone the establishment of a rate once made.

While the commission should doubtless be empowered to promulgate entire schedules of rates, they should have discretion in the exercise of this right, thus enabling the commission to afford relief where it is most urgently needed, and to proceed with greater conservatism and caution than would be the case if they were required within a definitely prescribed time to establish rates covering all classifications and all schedules. Some latitude in the exercise of this power will enable the commission to make such rates as will be maintained by the courts, should appeal be prosecuted by the railway companies to test the same.

I am strongly of the opinion that while it should be the duty of the commission to investigate all complaints, their action should not be made to wait upon the filing of the complaint. The great body of the people, who, in the aggregate, suffer the burdens and wrongs of excessive transportation charges, cannot appear before the commission and make complaints. The consumers of coal and merchandise and special commodities are the ones who really pay the freight. They do not deal directly with the railroads and do not pay freight to the railway company at all. The dealer who sells to the consumer pays the freight in the first instance, but charges the same over against his customer. The man who buys lumber, fuel, furnishings, clothing and other supplies, is the man who has great cause for complaint. He, however, cannot make complaint. He never knows how much of the cost price of any article purchased is an excessive freight charge. To limit the action of any commission to cases where complaint is made, is to practically destroy the value of railway regulation at all for the great body of the people.

The commission should be clothed with power to enforce publicity in respect to all matters pertaining to the public interest. Invested with this power, necessity for prosecution would much less frequently arise. Full knowledge on the part of the commission respecting the earnings and expenses in the operation of railroads is essential, as a basis of rate making. No rates established by the commission can be maintained in the courts, if attacked, excepting such rates are reasonable and just to the railway companies. To determine this it is of primary importance that the commission should be in possession of all information in detail pertaining to the capital invested, the cost of operation and maintenance.

One of the most important duties of a commission should be to protect the public from the wrongs inflicted upon it by over-capitalization on the part of the corporation. The state should know the value of its railroad properties, and it should be unlawful for railroad companies to issue stocks and bonds without first having established, to the satisfaction of the commission, or other authority representing the state, that there is full value back of every dollar of the obligation represented by stock and bond issue. The people should no longer be required to pay transportation charges upon an enormous over-capitalization of the transportation companies which it charters to do business.

However perfect any state law for the regulation and control of commerce, it will fail unless it be strongly enforced. Hence its success in operation will depend entirely upon the commission charged with its administration. The method of selecting the commissioners, therefore, becomes of the highest importance. Upon this subject there is wide difference of opinion. The result of my own investigation and reflection leads me to the opinion that there are controlling reasons why men better qualified for the special duties required of commissioners can better be secured by appointment than by election. The work of the commission in fixing rates must stand or fall, as it meets the tests which will be applied in a court of appeals, where such work is very certain to be tested. To be sustained, rates must be just and reasonable to the railway corporations. In fixing the rate, therefore, if the commission is to do justice to the public, it must reduce the rate as much as possible and still make it fairly and justly remunerative and profitable to the railway companies. This requires a technical and expert knowledge of traffic conditions, and of the cost of railway construction, maintenance and transportation. Wherever test is made in court of the work of the commission, they will find themselves confronted by the ablest traffic experts in the employ of the great railway companies. They should be able to meet them in so far as possible.

The selection of men having such qualifications can be more certainly made by appointment than by popular election, in the midst of partisan feeling and excitement due to a political campaign. Indeed, it might very easily transpire that one wholly unqualified, either as to the possession of training and experience, or the qualities of mind to acquire expertness in this important work, but with popular elements of character and experience in campaigning, would be the more likely to secure election than one whose experience and talent had fitted him especially for this line of work.

Upon the necessity of establishing a commission to protect the interests of the people of each state, there would seem to be no need of argument. The conditions themselves existing in the states where the control is wholly in the hands of the railway companies, and the benefits realized in every state which has taken any steps whatever for such regulation, would seem to be conclusive. Every commonwealth must sooner or later enact such legislation. It will be resisted by the corporations.

The widespread interest manifested throughout the country warrants the belief that every state with weak or imperfect statutes upon the subject, and such states as have no statutes at all, will ere long adopt such legislation as will establish a control of railway service and railway rates.

Railway managers, with rare exceptions, agree that the public should have no voice in regulating railway services or railway rates. Not all high railroad officials have the same boldness to declare their positions that Mr. Milton H. Smith, president of the Louisville and Nashville railroad company, disclosed in testifying, upon an investigation into rates on his line of road, conducted by the interstate commerce commission. This testimony was given in a proceeding before the commission prior to the Supreme court decisions which deprived the commission, of all authority to determine as to the reasonableness of the rates:

"Commission: We exercise no authority over your road until it has been determined by investigation that the rate is an unreasonable one. Your objection comes to this, that there ought to be no authority any where which has power to inquire whether the rate on the Louisville & Nashville railroad is reasonable or unreasonable?

"Mr. Smith: That is my position.

"Commission: Now let us go back to our question. That is the foundation of it all. Here are these two points connected by your line of road and by no other line. You say that the government ought to leave you and the shipper who resides at those places free to contract. Now, that shipper is obliged to pay whatever you charge?

"Mr. Smith: No.

"Commission: What could he do?

"Mr. Smith: He could walk; he can do as he did before he had a railroad and as thousands now do who have not railroads."

Of course we can walk. If all were compelled to walk it would at least put an end to favoritism and place each individual on an equality with every other. But that is not what President Smith proposes. He and all other railway presidents allow Mr. Rockefeller to ride, while his competitor in business must pay for himself and enough more to help pay for Rockefeller's ride. Whenever any shipper complains, he is told to pay the charge or walk.

In whatever way other railway managers have veiled their designs by greater diplomacy and finer phrasing, they have, with a sole regard to their own gain given to every community in the country good service or bad, with discrimination or otherwise, at as high rates as they desired to make, and the only alternative offered to the public has been, and still is, to pay up or walk.

Under their system a few men have grown very rich, a few cities have been made very great commercial centers. But equality of opportunity has been destroyed for the individual or the independent business enterprise, and, in thousands of communities, the natural advantages for growth have been nullified, development arbitrarily dwarfed, and all commercial activities limited to mere local distribution.

There would be no Standard Oil monopoly to-day, no meat monopoly, no coal monopoly, no grain monopoly, no great combinations filling the entire industrial field, and destroying all industrial independence and freedom, no artificial restrictions upon the upbuilding of cities and towns in every state sacrificed to the making of great markets at railway terminals,—in short, there would not have been imposed upon American people a system which presents to this generation the gravest problem that has confronted democracy, if,—

(1) The federal government, in the exercise of its lawful authority, had, for the last thirty years, fully discharged its duty to the people who maintain it, by controlling railway services and railway rates on all interstate commerce; and,

(2) If each state government, in the exercise of its authority, had likewise fully discharged its duty to the people who maintain it, by controlling railway services and railway rates on all state commerce.

The control of transportation lines with power to regulate the service and the rate is the control of the industrial and commercial life of the people of any community or any country.

It is well to recall again fundamental propositions in considering the regulation and control of interstate commerce.

The Supreme court of the United States has held that: "The business of a public carrier is of a public nature, and in performing it the carrier is also performing, to a certain extent, a function of government."

Government may conduct the transportation business itself as it does in carrying the mails, and limited quantities of merchandise carried through the mails. The business may also be conducted by corporations such as the railway companies chartered by state government and authorized to engage in transportation as public carriers. But the investment of private funds in the construction of railways and the conduct of the business by private corporations in no wise changes its character. It is still a public service and a function of government. As declared by the same court:

"It has never been considered a matter of any importance that the road was built by the agency of a private corporation. No matter who is the agent, the function performed is that of the state. Though the ownership is private, the use is public."

The government has a duty to perform in the regulation and control of railway transportation, because the service is a public service and essentially a function of government. But there are other reasons.

The railway corporation is a natural monopoly. Its lines once established in a given territory, it naturally excludes other capital from investment in a field which it covers. People living along its line, and in the country tributary to it, must market their products and receive their supplies over its road. They have no choice. The government had empowered the railway company to take their land on which it has built its road. They must accept their services, or they must walk. The government has placed the corporation in a position where, uncontrolled, it can tyrannize over individuals and entire communities. It is therefore bound to protect them against any wrong or injustice at the hands of its creatures. Nay, more, the government is under obligation to see to it that the corporation performs its full duty to all persons and all places, efficiently, impartially and upon reasonable terms. The government cannot divest itself of this responsibility. One of the ablest of the United States Supreme court judges, speaking for that court, said:

"But a superintending power over the highways and the charges imposed upon the public for their use, have always remained in the government. This is not only its indefeasible right, but it is necessary for the protection of the people against extortion and abuse."

The duty which the state owes to protect the commerce of the state, the federal government owes to protect the commerce of the country.

It required a ten years' struggle to enact the interstate commerce law. So powerful and effective was the railway opposition in congress, the measure was defeated session after session. When finally enacted in 1887, it created a commission of five men, to be appointed by the president with the consent of the senate. In this act it is declared that all transportation charges shall be reasonable and just and that every unjust and unreasonable charge is prohibited and unlawful; that the commission created by it is authorized and required to execute and enforce all the provisions of the act; that it shall investigate, inquire into, report and order a discontinuance of all violations of the law; that it shall execute the law by petition to the court to enforce its orders, and that the court shall enforce all lawful orders made by the commission.

When enacted, it was believed by congress and throughout the whole country, that the law invested the commission with authority to supervise rates, and to issue orders and decrees with respect to what a rate should be. When it became apparent that the enactment of the law could no longer be postponed, the railroads were ready with ingenious suggestions for amendment to weaken and destroy its efficiency and lay the foundation for its overthrow in the courts.

Under the persistent attack of the railways, the authority of the commission was narrowed by a line of decisions which the court rendered from time to time. Finally, by 1897, a majority of the Supreme court had decided that the law was not at all what congress declared it to be. By judicial decision the commission was deprived of all power to supervise rates, or to issue orders or decrees with respect to what a rate should be, and transformed into a body merely authorized to hear complaints, take testimony and make recommendations.

In its report for 1897, the commission says:

"As now construed by the Supreme court, the carrier is given the right to establish and charge these rates independent of the judgment of the commission, and independent of the action and judgment of any court or other tribunal; the right to establish, demand and receive unreasonable and unjust charges is not prohibited; and that in respect to the charges which may be demanded and received for any transportation service, the carriers are made the judges in their own cases as to what is reasonable and just."

Thus, all that the people, through congress, had been struggling to secure since 1877, all that they believed they had secured through the enactment of the interstate commerce law in 1887, had been practically swept aside. The victory attained by the people in congress had been changed into defeat by the railroads in the federal courts. The people were just where they had started twenty years before.

For years the Interstate Commerce commission has laid before congress all the facts: the systematic increase in rates; the gross injustice in discriminations; the utter helplessness of the commission to afford relief. In its annual report to congress, December 1897, the commission reviewed the Supreme court decisions and made it clear that there was no power left in the law to protect interstate commerce. It urged in that report the necessary amendments upon the attention of congress, and this has been repeated in extended discussion and reinforced with recommendations in each annual report for the last seven years.

In 1898 the commission reported to congress that there was "no power, in the judgment of the commission, or in the judgment of the court, to restrain a railroad company from demanding and receiving unreasonable and unjust charges."

They said further:

"The power of fixing and establishing reasonable rates or charges in advance is the only practical legal remedy for extortion and unreasonable and unjust charges."

Again, in 1899, congress having failed to act, the commission said:

"Every consideration of private justice and public welfare demands that the railway rates shall be reasonable, uniform to all shippers, and equitable between all communities. Until needful legislation is supplied, that demand must remain unsatisfied."

Again, in January, 1900, the commission urged action, and among other things, said:

"The request of the commission for needful amendments have been supported by petitions and memorials from agricultural, manufacturing and commercial interests throughout the country, yet not a line of the statute has been changed, and none of the burdensome conditions which call for relief have been removed or modified. . . . It is sufficient to say that the existing situation and the developments of the past year render more imperative than ever before the necessity for speedy and suitable legislation. We, therefore, renew the recommendations heretofore made, and earnestly urge their consideration and adoption."

Every effort to pass a bill embodying the recommendation of the commission to afford relief to the overtaxed commerce of the country having failed, the commission in its next annual report to congress of 1901, said:

"The reasons for urging these amendments have been carefully explained and repetition of the arguments at this time can hardly be expected. . . . Knowledge of the present conditions and tendencies increases rather than lessens the necessity for legislative action upon the lines already indicated, and in such other directions as will furnish an adequate and workable statute for the regulation of commerce among the several states."

This important legislation having failed again in 1902, the commission once more appealed to congress. Referring to the defect in the law, the commission in this report, says:

"That this imperfection is curable is equally conceded. The fullest power of correction is vested in the congress, and the exercise of that power is demanded by the highest considerations of public welfare. . . . The sense of the wrongs and injustice which cannot be prevented in the present state of the law, as well as the duty enjoined by the act itself, impels the commission to reaffirm its recommendations for the reasons so often and so fully set forth in previous reports and before the congressional committees. Moreover, in view of the rapid disappearance of railway competition and the maintenance of rates established by combination, attended as they are by substantial advances in the charges on many articles of household necessity, the commission regards this matter as increasingly grave, and desires to emphasize its convictions that the safeguards required for the protection of the public will not be provided until the regulating statute is thoroughly revised."

Recognizing the right of the federal government to regulate and control interstate transportation, and the wrongs and injustice which could not be prevented without further legislation, President Roosevelt, in his first message to congress, with respect to the interstate commerce law, said:

"The act should be amended. The railway is a public servant. Its rates should be just to, and open to all shippers alike. The government should see to it that this is so, and should provide a speedy, inexpensive and effective remedy to that end."

February 9, 1903, an act relating to the payment of preferential rates was approved. It contained nothing, however, which could in any way aid the commission in affording protection against unreasonable and extravagant rates. The commerce of the country was still subject to the levying of a transportation tax as heavy and burdensome as the railroad companies were pleased to impose. Representative business men, shippers and producers, were petitioning congress and appearing before committees, with testimony and argument, to reinforce their prayers for relief. December, 1903, in its annual report, the commission again made a strong appeal for legislation which would clothe them with authority to establish a reasonable rate. Referring to the act of February 13, 1903, it said:

"It has added nothing whatever to the power of the commission to correct a tariff rate which is unreasonably high or which operates with discriminating effect. It greatly aids the observance of tariff charges, but affords no remedy for those who are injured by such charges, either when they are excessive, or when they are inadequately adjusted. . . . This is the point to which the attention of congress has been called. This is the defect in the regulating statute which demands correction. In previous reports this question has been frequently and fully discussed. We have commented at length upon the weakness and inadequacy of the law as its provisions have been construed by our courts. We have carefully pointed out the amendments which we deemed essential, and explained in detail the reasons for our recommendations. We are unable to add anything of value to the presentation heretofore made. Our duty in this regard has been performed."

For seven long years this broken down statute has been before congressional committees, where, day after day, arguments and appeals have been made in vain to secure action to repair, in some measure, its defects.

As the law was weakened and the efficiency of the commission impaired by judicial decisions from time to time, leaving the interstate transportation of the country without regulation, railway rates became higher, railway abuses began to multiply, and protests and complaints came from all quarters of the country, and from all classes of industry. Within a year or two railroad consolidation became marked. The railroad business of the country was literally honeycombed with discriminations in the form of rebates, and transportation charges were everywhere generally advanced.

The Industrial commission, in its report submitted to congress December, 1901, after a careful investigation of the subject, said:

"Summarized, we conclude that the advance in the published freight rates upon all the railroads of the country is probably not less than twenty five per cent."

Powerless to restrain the railroads from imposing higher rates, powerless to prevent discrimination in shipping charges and facilities to favored interests and localities, the commission could only, year after year, set forth, in its annual report to congress, the gravity of the situation, and the urgent need of legislation for the protection of the commerce of the country. In its latest published report, it is made very clear that rates have generally advanced in all sections of the country.

The coal rates, the iron schedules, the rates upon grain and its products, lumber, live stock and its products, are generally higher than four years ago—the increases upon coal rates alone amounting to very much more than twenty five million dollars per year.

The Interstate Commerce commission has shown that the average rate per each ton of freight—not per ton, per mile—was about 12¾ cents higher in the spring of 1904 than in 1899. When the increase was applied to the traffic of 1903, it was found that it meant an increase in gross earnings, from this source alone, of over $155,000,000. From this cause alone, the gross earnings from the freight traffic in 1903 were thus over 13 per cent greater than would otherwise have been the case. The gross earnings from freight traffic were $424,282,871 greater in 1903 than in 1899. Of this amount $155,000,000, or about 36 per cent, was derived from increases in the rates.

No one will question the soundness of the proposition that as the volume of traffic increases and the efficiency of transporting is developed and improved, the cost is greatly reduced, and rates should fall proportionately. But, instead, rates have steadily advanced, adding greatly to the increased cost of living, wrongfully imposing burdens upon the great body of consumers throughout the country.

The volume of traffic has greatly increased since 1896.

In 1897 the tons of freight carried one mile per mile of road amounted to 519,079. In 1902 it stood 793,351. The increase thus amounts to 274,272, or about 52 per cent.

The facilities for handling were greatly improved, increasing the number of tons carried in each car, and the number of loaded cars in each train, as well as the capacity of engines for moving larger loads. Roadbeds and tracks have likewise been improved, and all of the elements of cost in transporting freight greatly reduced. At the same time the cost of these improvements has, as a rule, been charged to operating expenses, and paid for in the increased rates by the people.

In 1897 it required 1,647 cars to carry 1,000,000 tons of freight. In 1903 it required only 1,268 cars to carry 1,000,000 tons of freight.

In 1897 each locomotive carried 36,362 tons of freight. In 1903 each locomotive carried 51,265 tons of freight.

In 1897 the average number of tons per freight train mile amounted to 204.62. In 1902 it amounted to 296.47. Here, then, we have an increase in the efficiency of the road to handle freight that is equal to about 42 per cent.

With the increase in the volume of traffic the profits of handling the same will be relatively very much larger, even though there is no improvement in the facilities of transportation. But where the facilities have all undergone the marked improvement above noted the profits are, of course, enormously increased. This proves to be the case with the railway companies during recent years.

For the whole country gross earnings and net earnings per mile were as follows:

The gross earnings per mile were $6,122 in 1897, and $8,265 in 1902, an increase for the period that amounted to $2,503 per mile, or to 40.9 per cent.

The net earnings per mile amounted to $2,016 in 1897, and to $3,084 in 1902, an increase of $1,032 per mile, or 46 per cent.

The net earnings per mile in 1897 were equal to 6 per cent on $33,600. The net earnings per mile in 1902 were equal to 6 per cent on $50,800.

We have, then, an increase in the volume of the traffic amounting to 52 per cent, an increase in the efficiency of the road to handle all the traffic equal to 42 per cent, with a resulting increase in gross earnings for the period amounting to 40.9 per cent per mile of road, and of the net earnings amounting to 46 per cent. Add to this the fact that the net earnings per mile on all the railroads of the country equaled 6 per cent on a capitalization of $33,600 for the year 1897, while the net earnings per mile by 1902 had amounted to such a figure as would equal 6 per cent on $50,800 per mile, and we have a result, the significance of which can escape no intelligent man.

Observe, now, what is definitely shown with respect to advancing rates.

The approximate average rate per ton per mile was 7.24 mills in 1899, and 7.57 mills in 1902.

The average revenue per freight train mile was $1.63 in 1897, and $1.79 in 1899, while in 1902 it amounted to $2.44.

Whenever the public complains that rates are unjustly increased, we are at once told in a sweeping, though somewhat indefinite way, that the advances have been made to meet increased expenses and higher wages paid to employes. The corporations well understand the public regard for all the men employed in this hazardous calling, and that such an explanation will go a long way to quiet criticism.

It is true that material is somewhat higher. It is likewise true that the companies are paying higher wages or rather higher salaries. The total wages paid by the roads of late years have increased, owing mostly to the increase in the number of men employed to handle the traffic or business. But the total wages per mile of road from 1897 to 1902 did not increase over 32 per cent, which is a much lower ratio of increase than the increase in both gross and net earnings.

The average daily rate of wages per each person also increased, but in this case the increases were comparatively small, except for the officers of the road, for whom substantial increases may be noted. The average increase per person, outside of the officers, does not exceed five per cent. This is plain from the following table:

AVERAGE PER CENT OF INCREASE IN WAGES ON ALL THE RAILROADS IN THE UNITED STATES FROM 1897 TO 1902, INCLUSIVE:

Classification	Per Cent	Classification	Per Cent
General officers	17.08	Other shopmen	4.09
Other officers	9.37	Section foreman	1.17
Gen. office clerks (no increase)	......	Other trackmen	7.75
Station agents	4.04	Switch tenders, crossing tenders and watchmen	2.90
Other station men	.61	Telegraph operators and dispatchers	5.78
Enginemen	5.20	Employes—acct. floating equipment	7.52
Firemen	7.31	All other employes and laborers	4.26
Conductors	4.56		
Other trainmen	7.36		
Machinists	5.82		
Carpenters	3.48		

It will be seen from the foregoing table that the increase in wages means—outside of high salaried officials and a small addition ranging from one per cent to seven per cent in the wages of all other employes—simply a larger total amount paid out as wages owing to the employment of a larger number of men to handle the great increase in the volume of the traffic.

No student of the railway problem can fail to comprehend the deep significance of the power which unrestricted control of transportation enables railways to exert upon the industrial and commercial life of the people of every state in the Union.

The railroads are not only able to maintain their present high rates, but can at their pleasure continue to advance them until the charge is as high as the traffic will bear. Unless controlled, this is what they will do. It is but little more than two months since the Interstate Commerce commission was called to Chicago to hear protests of shippers against having forced upon them, under cover of a uniform bill of lading, an increase in freight rates which would have amounted to more than a quarter of a million dollars at one stroke. There is now no competition to restrict railroads in any degree. Consolidation has completely destroyed all competition in rate making. While competition was never effective as a regulator of rates, it formerly had some restraining influences. Often it has reduced rates. In other cases it has prevented rates from becoming extortionate. This was more particularly true of lines between great traffic centers. For the greater number of intermediate stations on independent lines, there could be no direct competition whatever.

In more recent years railway managers had been working to eliminate competition, even before the new plan of consolidation was devised. They were quick to discover that railroads are monopolies, and that competition between them differed from competition in other lines of business. The advantages of maintaining rates were seen, and the roads early made contracts for a division of the traffic, or for the earnings between competitive points. This was called pooling. In 1887 pooling was prohibited by the interstate commerce law. An effort to evade the interstate commerce law was then made by the roads entering into traffic agreements. These, also, were declared illegal by the Supreme court in 1897.

We now come to the great master stroke for the absolute control of the highways of commerce and trade by the consolidation of the railroads of the country under what is called the community of interest plan. Under this plan practically the entire vital railroad mileage of the country has passed under the control of six groups of financiers, each group, in large measure, controlled by one man. The effect upon railway interests and the public has been tremendous.

In order to convey some idea of the enormous combinations which have been formed in the railroad world and of the unlimited power thereby centered in the hands of a few individuals, the following statement is submitted. The figures in this case have mostly been taken from Moody's Manual of Corporations.

The Six Great Groups

Classification	Number of roads embraced	Mileage of each group	Capitalization of each group
Vanderbilt group	132	21,888	$1,169,196,132
Pennsylvania group	280	19,300	1,822,402,235
Morgan-Hill group	225	47,206	2,265,116,359
Gould-Rockefeller group	109	28,157	1,368,877,540
Harriman-Kuehn-Loeb group	85	22,943	1,321,243,711
Morse-Leeds group	9	25,092	1,059,250,939
Total	922	164,586	$9,006,086,916
Allied Systems	250	13,721	380,277,000
Total under control	172	178,307	$9,386,363,916

The disclosures of this statement are positively startling. Nearly ninety per cent of the total railroad mileage, representing, in fact, almost all of the principal commercial highways of the country, are controlled by six sets of financiers with an identity of interests, which, in effect, makes a single control. Need we marvel that the present rates are not only unreasonably high, but that they are being advanced from time to time? From time to time the rates go up whenever this bold and powerful tax gatherer chooses to increase the levy.

The logical results of this consolidation must be obvious to all. The entire country has been partitioned and apportioned between these great railway groups. It is indeed a great conquest. Each group dominates its own territory. With agreements as to classifications, rates and division of traffic, the railway business has ceased to be a competitive business. The railway business of this country has become a monopoly in fact. This monopoly controls transportation and transportation charges on interstate commerce and upon state commerce, excepting where states have provided for state control.

It was claimed for this consolidation that it would reduce expenditures, increase efficiency and in every way aid the economics of railway traffic. It was affirmed that this was the only purpose of consolidation. Whenever investigations conducted by the Interstate Commerce commission touched this system at any point, railway managers were loud in their protestations that the public would share in the benefits arising from the changes which were only administrative in their character, and with manifestations of indignation, from time to time, they resented any implication that such consolidation was for the purpose of extortion and abuse. The insincerity of these expressions is exposed.

In their last volume of published reports, the Interstate Commerce commission records the following:

"One of the most significant things in recent railway operations is the steady advance in the cost of transportation of freight by rail. A few years ago the impression was general that freight rates could not and would not be advanced. Railway traffic officials frequently affirmed this in their testimony. When the commission had under consideration certain consolidations of railway property, the eminent gentlemen who brought them about, stated, under oath, that the purpose was not to advance but rather to reduce rates. Recent history belies this prediction."

Of these advances the Interstate Commerce commission says:

"The rates upon these commodities which constitute the bulk of interstate traffic have been advanced in nearly all sections. . . . What the total amount of increase from all these causes has been can not be said with any degree of certainty. The advances have usually been small as applied to a single ton or a single hundred pounds, and it is difficult to form any adequate comprehension of their tremendous significance in the aggregate. The increase of but ten cents per ton in the coal rates in the entire country would mean more than twenty five million dollars annually, and the actual advance has been much more than this. . . ."

When the rates on lines in different systems go up in exactly the same amount at exactly the same time, it smacks pretty strongly of conspiracy. Respecting these unjustifiable advances, the commission makes the following observation:

"They have been, almost without exception, the result of concerted action. . . . It is idle to say that where such condition exists, where, for example, every one of the numerous lines transporting grain from Chicago, St. Louis and kindred points to the Atlantic seaboard, advances its rates upon the same day and by precisely the same amount, there has been no understanding between companies."

After noting the wide range and extent of these advances, and the heavy burdens which they everywhere impose upon the producers and consumers of the country, the commission says further:

"The freight rate has been properly termed a tax imposed for the benefit of the carrier rendering the service. The effect of this advance has been to enormously increase the tax laid upon the general body of producers and consumers for the benefit of that species of property which renders the service."

It is evident that this great railway combine is using its enormous powers unsparingly, not only over roads and traffic conditions, but over industrial conditions generally.

Consider what they have done. By consolidation nine hundred and twenty two different roads and nearly half a hundred different railway systems have been merged into six greater systems, reaching out with their network of lines into the remotest sections of the land. Their interests are now joined. Their action is harmonious. Their purpose is a common one. They direct the movements of commerce and trade. They determine where its lines shall converge. They make the great commercial centers.

But why should consolidation stop with the consolidation of railway lines? Why should control stop with the control of transportation? Why not control great industries? Why not control markets, and fix prices to consumers? Consolidation and control of transportation systems is the base on which to build up a greater system. Observe its progress. Observe the identity in interest and ownership which is beginning to appear between the Standard oil, steel, coal, meat, and other monopolies and the great railway systems of the country.

With the railway systems commanding all the highways, the alliance was an inevitable one. The railways consolidated into big groups, favored big shippers with millions in rebates, exacted in higher charges from rivals and from the consumers at large. The consolidation was breeding its own kind. The masters of the highways were entering the industrial fields.

They owned the coal trust; they were taking on iron and steel.

The captains of industry, controlling pipe lines and transports, were hungering for a share in the highways to market. For long years they have been partners in the criminal violation of the statutory and common law. The field was enlarging. The country was entering upon a new era of expansion. The consumers were multiplying. If the railways were to control the highways, the alliance was inevitable. The trusts were coming in under the system.

The motives which promoted consolidation of the railways of the country into six great groups, operates with powerful effect in concentrating shipments in a few hands, with a view to large traffic transactions. A rate slightly to the advantage of one company must ultimately give the favored concerns all the business.

As an abstract economic proposition it may be true that increased profits in the hands of a few shippers may allow larger development than under conditions where the business is divided, but it is certainly harmful to any community from social or economic consideration. Wealth may be more rapidly accumulated when one individual or a combination of individuals secure a monopoly of the business of any town or city, but the thrift and prosperity of any community depend upon a general, even though moderate, success coming to the largest possible number. The railroad prefers to deal with large shippers, and it encourages centralization in business. It has a contempt for the small dealer. It cannot see the individual. It is looking for tonnage. Big deals in traffic appeal to it. It creates and nourishes trusts and combinations.

I invite attention to some examples of the methods employed by the railroads to consolidate shipping, resulting in the creation of monopolies. These facts have been obtained from official reports and other reliable publications.

The second most important product of the earth is coal. The supply is severely limited. There is absolutely nothing to take its place for the purpose of fuel and power in the world. The entire wood supply could last but a very short time. The anthracite or hard coal of the United States is limited to 484 square miles. The Industrial commission reported that nine tenths of the entire supply has passed from the hands of private owners into the possession of eight railway companies which act together in restricting the output and keeping up the price. The lines of these eight railways furnish the only available means of transporting anthracite coal to market. In pursuit of a settled policy these railroad companies have forced private owners to sell their coal mines for half their value. This was accomplished by increasing the freight rates and by refusing cars to carry coal for private owners whenever such owners could not be brought to terms by the establishment of exorbitant transportation rates.

To prevent the consummation of this iniquity, the people of Pennsylvania, in 1873, adopted a constitutional provision to prohibit common carriers from mining or manufacturing articles for transportation over their lines, or from buying lands, excepting such as should be required for the operation of the railroad. In defiance of this provision of the constitution, these railroads pursued their settled policy of forcing the mine owners to sell their lands to the companies, and of acquiring such lands solely for mining purposes, and of conducting mining operations throughout the Pennsylvania coal fields, not only in anthracite, but in bituminous coal as well.

After acquiring the monopoly of the anthracite coal fields, owning the coal and owning the railroads over which the coal is transported to market, they fixed, and have ever since maintained, the freight rates at an exorbitant figure in order to make the consumers throughout the country pay dividends on the over capitalization of both the railroads and the coal mines. Freight rates to-day on anthracite coal are three times as high as on bituminous coal.

This coal trust bears harder, even, upon the unfortunate and helpless laborer that mines the product at the wage level of a generation ago than upon the consumers, who are just beginning to feel the burden of its increasing oppression. Its utter indifference and contempt for constitutional and statutory law and for public opinion should awaken in the people of this country the spirit that framed the declaration of independence and founded the government in which the will of the people should be supreme.

That the railroads manipulate elevator combinations, controlling the grain market, has been well understood for many years. From time to time conclusive evidence of the existence of such combinations have been obtained. Effort has been made to weaken the force of such testimony, and special excuses have been offered in particular instances in attempts to break the effect of such evidence.

The United States exports annually enormous quantities of grain, but, says Judge Prouty of the Interstate Commerce commission: "One can count upon his fingers the concerns which bring the bulk of it to the American seaboard."

Grain upon the Chicago market is handled by half a dozen concerns. It is brought from the fields to Chicago by as few men. One company buys upon one line of railroad. Nobody else can buy there. Another, upon another line. One company alone does the buying on each road. The methods of discrimination adopted by the railroads are: (1) barefaced cash money payments; (2) elevator commissions; (3) excessive car mileage similar to the discriminations in the packing house products; (4) sometimes a shipper will pay the full interstate rate in consideration that he shall receive preferential rates on traffic within the different states.

Mr. A. B. Stickney, president of the Chicago Great Western railway, is authority for this statement respecting the granting of favors to the large grain dealers: "If all who have offended against the law were convicted, there would not be jails enough in the United States to hold them."

The importance of a very slight rebate in the grain business is seen when the margin of profit is known. A representative of Armour and Co. testified before the Industrial commission that the difference of one sixteenth of a cent per bushel will determine where the grain will go.

The Industrial commission reports that the terminal grain elevators at Chicago are owned by comparatively few men or firms. It says further that the owners of the large public elevators also engage in buying and selling grain. These large grain elevator companies also own practically all of the elevators along the lines and at the terminals of each railway system.

The weight of the testimony taken by the Industrial commission shows that the grain business is substantially in the hands of five large dealers operating over eight western railroads. They are:

Rock Island R. R., Charles Councilman; Northwestern R. R., Bartlett, Fraser Co., and Peavy Elevator Co.; C., B. & Q. R. R., and the C., M. & St. P. R. R., Armour & Co.; Santa Fe R. R., M. Richardson; Union Pacific R. R., and others, Peavy Elevator Co.

In an investigation prosecuted by the Interstate Commerce commission, they found and reported in 1902 that the monopoly of grain buying is conferred by the railroad companies on some particular party with the excuse that it is the effect of competition. Respecting this the commission says:

"While the investigations of the committee have not fully covered this aspect of the case as yet, it is a matter of common information, and we know from repeated complaint received, that some one firm or some one individual purchases substantially all of the grain which is handled by a given line of railway, and the claim is made, and the inference is almost a necessary one, that this firm or individual must receive concessions which enable him to underbid other buyers in the same market."

They say further in conclusion upon this subject:

"At the present time grain and grain products move from points of origin to the seaboard generally upon secret rates. This is entirely true of that portion which is exported, and, in the main, true of domestic traffic."

Under this system the producer of grain is compelled to sell his product in a market where prices are fixed, not by the law of supply and demand, but by the arbitrary will of the favored elevator company, which, in combination with and through the favoritism of the railway company, is in a position to dictate market prices.

For reasons best known to the railway managers, they likewise discriminate against the milling interests of this country, and carry grain for export at a rate which is operating to destroy the milling business of the country. Formerly, the milling was done here and the product mostly exported in the finished form. The grain trust appealed to the railroads. Immediately rates were readjusted.

In 1900, the aggregate of flour exported was 96 per cent of the entire export of wheat; in 1901, it had dropped from 96 per cent to 55 per cent, owing to the discrimination practiced.

April 10, 1902, it was stated before the Interstate Commerce committee of the house of representatives, by Mr. Eckhardt, representing the Chicago board of trade:

"That it is unfair and unjust to the great industries of this country to compel us to pay a tariff rate of 17½ cents a hundred on flour from Chicago, for instance, and, at the same time, to carry wheat on a secret cut rate of from eight to ten cents per hundred pounds. It practically means confiscation of so much milling property."

It was further stated that the milling capacity of this country is sufficient to grind up all the wheat produced in the country in five months. With the railroads masters of rate making, the milling property located in thirty three different states of the country is to stand idle, while the railways and large elevator companies in combination work out some division respecting traffic, profitable alike to both.

The meat monopoly of to-day had its origin in the Evener combination, which was organized in 1873. The Evener combination was formed upon an agreement made between the Big Four, consisting of Armour & Co., Swift & Co., Nelson Morris & Co., and Hammond & Co., and the three great traffic lines running from Chicago to New York. These roads, the Pennsylvania, New York Central, and Erie, agreed to charge $115 for each carload of cattle shipped over their lines from Chicago to New York, and to allow certain shippers to Chicago $15 of this amount on each car load of cattle so shipped.

The result was the destruction of the St. Louis cattle market, which before that time had been in a very prosperous condition, and the concentration of the trade in Chicago, where it has since remained. Says the report of the committee appointed by congress to investigate this industry in 1900:

"The inevitable effect of this combination which gave a premium of $15 a car upon all cattle shipped from Chicago east was to concentrate the marketing of all western cattle at Chicago."

During the five years between 1873 and 1878, the business of the Big Four grew so rapidly that at the end of that period they had practically monopolized the entire cattle business.

The Evener combination terminated in 1878-1879.

When the Evener combination disappeared, the dressed beef combination took its place. This combination was organized to control the market on beef products, forcing down the price of live stock purchased from the producer, and forcing up the price of meat product sold to the consumer. While this organization originally comprised but four of the great packing houses of Chicago engaged in purchasing and slaughtering beeves, they broadened and extended the combination so that the markets on all meat products have been brought into subjection and control. The congressional committee, investigating this subject in 1890, after a protracted session in St. Louis and Chicago, stated in their report:

"So far has the centralizing process continued, that, for all practical purposes, the market of Chicago dominates absolutely the price of beef cattle in the whole country. Kansas City, St. Louis, Omaha, Cincinnati and Pittsburg are subsidiary to the Chicago market, and their prices are regulated and fixed by the great market on the lake."

They say further:

"We have no hesitation in stating as our conclusion from all the facts, that a combination exists between the principal dressed beef and packing houses which controls the markets and fixes the price of beef cattle in their own interest."

They found that this combination had been formed: (1) to fix the price of beef to purchasers and consumers so as to keep up the price in their interests; (2) not to interfere with each other in certain markets and localities in the sale of their meats; (3) to act together in supplying meat to public institutions at Washington, the bids for the contracts being made by one company and the meat supplied by each of the packers in turn. How was this accomplished?

Aided by the railroad companies this great combination has been able to crush out opposition in every quarter of the country. There is no such thing as a free and open competitive market in which the farmer can sell a pound of beef or pork or mutton on the hoof. His prices are made for him arbitrarily by this combine. There is no butcher shop in the United States in which a consumer can purchase a pound of beef, excepting at the price controlled by the meat trust. The testimony of one of the strongest concerns in the combination, written down in the congressional report, frankly admits that they combined to fix the price of beef to the purchaser and consumer so as to keep up the cost in their own interest.

This all powerful monopoly of the meat business of the country could never have obtained so much as a footing, except for the arrangements which it effected with the railroads at the time of its organization.

The report of this important investigation says further:

"An unjust and indefensible discrimination by the railroads against the shippers of live cattle is made in the interests of the combine. This is the spirit and controlling idea of the great monopolies which dominate the country. . . . No one factor has been more potent in affecting an entire revolution in the methods of marketing the meat supply of the United States than railway transportation."

As an instance of the way in which the railroads assist the packers' combine, the committee cites the following:

"A man by the name of Schwabe, who was engaged in the butcher business in Freeland, Pa., was in the habit of killing some cattle to supply his own trade. Armour & Co. learned of this and sent a telegram to their agent, H. P. Lacey, which read as follows:

'H. P. Lacey, Freeland, Pennsylvania.

'Cannot allow Schwabe to continue killing live stock. If he will not stop, make other arrangements, and make prices so as you can get his trade. (Signed) Armour & Co.'

Schwabe refused. From this time on he could buy no meat from Armour & Co., and could not get any cars from the Erie railroad to ship his cattle from Buffalo, but was compelled to ship on the Delaware & Lackawana, a route not so direct. In other words, he was boycotted by Armour & Co., through the Erie Railroad Co. as their agent.

As a necessary result of the concentration at Chicago of the cattle trade by railroad discrimination, there was established at that place the Union stock yards, with a capitalization of $4,400,000. These yards were used as another means to discriminate against independent packers doing business east of Chicago. Exorbitant prices were charged these men for the feeding and watering of their cattle. The withdrawal of the palace cattle cars east of Chicago helped along this discrimination. These palace cattle cars are so arranged with racks and other appliances that the cattle can be fed and watered without being unloaded. These cars have been regarded with great favor by shippers and have added much to the value of meat when butchered. The trunk line railroads allowed $\frac{3}{4}$ of a cent a mile on each one of these cars each way as rent for the use of the cars.

Refrigerator cars, carrying dressed beef and owned by the packers' combine, are allowed $\frac{3}{4}$ of a cent per mile each way between Chicago and New York. Looking more closely into the question of refrigerator cars, we find them to be the worst form of discrimination. By an investigation made in 1899, it appeared that, on a single line of road, refrigerator cars, owned by three firms, earned $72,945.95 in nine months. An investigation in 1890 disclosed the fact that 250 private stock cars, costing $156,500, earned in two years a net revenue of $171,532.20.

The private car arrangement, while a great convenience in promoting discrimination, is also a powerful factor in aid of establishing monopoly. The Armour interests in Chicago have an absolute monopoly of the refrigerator business in the shipments of fruit between that city and California.

The investigation of the Interstate Commerce commission at Chicago October 10th, 1904, paid special attention to the fruit trust, which is controlled by the Armour interests. Evidence was offered to prove that Armour & Co. have practically a monopoly in the handling of fruit and other products that require the use of refrigerator cars. This concern, with the coöperation of the railroads, was able to compel commission merchants, fruit growers and all others engaged in the industry to pay an assessment of from twenty five to seventy dollars a car for the privilege of shipping fruit and vegetables in such cars. The penalty of refusal to comply with this demand was an embargo on all shipments and forced retirement from the business.

It was shown that all of Tennessee's products are barred from Chicago by a prohibitive icing charge of seventy dollars per car, while Georgia ships twice as much fruit in a car at one half the tariff rate, and twenty five per cent less in icing charges.

The railroads give rebates to the dressed beef men, which they refuse to shippers of cattle, even though they ship by the train load. January, 1902, the Interstate Commerce commission said in its report to congress, respecting the relations existing between the great packing houses and the railroads, the following:

"That the leading traffic officials of many of our principal railway lines—men occupying high positions and charged with the most important duties—should deliberately violate the statute law of the land, and, in some cases, agree with each other to do so; that it should be thought by them necessary to destroy vouchers and so to manipulate bookkeeping as to obliterate evidence of the transactions; that hundreds of thousands of dollars should be paid in unlawful rebates to the few great packing houses; that the business of railroad transportation, the most important but one in the country to-day, paying the highest salaries, and holding out to young men the greatest inducements, should, to such an extent, be conducted in open disregard of law, must be surprising and offensive to all right minded persons."

Concerning these concessions, whether by rates or rebates, the commission says later in its report:

"The effect is to give these large packers an enormous advantage over other similar competitors, who are located at other intermediate points. Already these competitors have, in the main, ceased to exist. We find in these disclosures a pregnant illustration of the manner in which secret concessions are tending to build up great trusts and monopolies at the expense of the small, independent operator."

I have passed by the Standard Oil, which must ever stand as the type and model of the whole monster brood, some of which are above outlined. With the aid of the railroads, it destroyed thousands of independent business enterprises, destroyed prosperous, thrifty communities and towns, happy homes, and individual hopes. But its hideous story is known in every household.

No power other than the government itself is equal to that of these industrial combinations always in close association and often identified in interest with railroad and transportation companies. Their tremendous political influence is shown by the mere recital of the history of the Interstate Commerce act, and by an examination of the records of congress for the last seven years. Which has had the stronger hold upon the state and national legislation during the last twenty years, the corporations or the people? Whose interests have been the more safely guarded? Where is the power lodged which has for seven years been strong enough to bar national legislation, designed to enlarge the powers of the Interstate Commerce commission? It is not necessary to charge venality anywhere, but that the public service corporations have been steadily undermining representative government in national, state and municipal legislation, no thoughtful man can question. They come between the people and the chosen representatives of the people.

I would in no wise disparage either the rights or the interests of the railroad side of this legislation. The question is one of very great magnitude. The amount of property involved is very large. The owners of railroads, and the holders of railroad securities must be protected in all of their rights. They must not be wronged in any way. They are entitled to such remuneration as will enable them to maintain their roads in perfect condition, pay the best of wages to employes, meet all other expenses incident to operation, and in addition thereto enough more to make a reasonable profit upon every dollar invested in the business. To preserve all of these rights, they are entitled to the strongest protection which the law can afford.

But the public, each community, and every individual, has rights equally precious. Upon the railway companies rendering an adequate and reasonable service at reasonable rates, all general prosperity is dependent. Deprived of either, every community is limited and checked in its growth; every business of whatever nature must languish and fail. The denial of an impartial service at reasonable rates, is the denial of equal opportunity, the denial of a square deal.

In the long struggle to secure some legislation, the friends of the measure have been content to ask little, and they have received nothing. But through all the years of waiting and disappointment, of ruin to individuals and demoralization to the business of many communities, public sentiment has been gathering force. It is all powerful when once aroused. Unless I mistake the temper of the American people, they will demand the full measure of their rights. They will not halt or stop or compromise until that demand is fully satisfied. The abuse of the rate making power lies at the foundation of the transportation problem. Through this the traffic can be controlled and centralized at railway terminals, business consolidated and combinations established. Remedial legislation, therefore, to be effective, must strike at the root of the evil. It must place the rate making power where it will be used fairly and justly to all concerned. The public has long permitted itself to be treated as though its interests were of small consideration. The miner, the manufacturer, the farmer, turn out the products which constitute the traffic of the country. They, and the consumers, are vitally interested in everything pertaining to the transportation of these products. The railroad corporation is chartered through the favor of the state, to engage in the transportation business, nothing else. It was created, and given its special powers and privileges to promote the general prosperity of all. It has not been vested with authority to decree that one shipper or city shall grow rich and great at the expense of another. It is preposterous that the corporation, which is merely a carrier, not the producer or consumer of the product carried, should be permitted to stand in relation to that product as though its interests were the sole interests to be considered. The carrier should not be permitted to say where the product shall be marketed. If it has authority to dictate rates, it can make it impossible for the producer to choose his own market. It can so arrange its schedule of rates, it can so conduct its service, as to force produce, merchandise and manufactures to the market which it chooses to build up.

The making of the rate is a matter of deep concern to more than one party to a traffic transaction. True, the railway company has large interests involved. This very fact unfits it to be the sole judge in making rates. Rates made by the railway company are made by a party prejudiced in its own interests and therefore certain to be unjust to the public. But its interests are not paramount to those of the public. The producer and consumer are likewise entitled to be heard as well as the railway company, and it is then the duty of the government, standing between, to determine impartially the rights of the railway company and the rights of the public.

In all of the hearings before congressional committees those opposed to enlarging the power of the Interstate Commerce commission seem to believe that there is something sacred about a railway rate; that it would be a veritable sacrilege for any one outside of the railroad management to lay a hand upon a freight schedule. Any critical investigation of railway tariffs, and the advances made in rates from time to time, will convince the student that rate making is more frequently controlled by the financial management than the traffic department of the road. But I am free to admit that rate making requires technical, expert knowledge and experience. The railroads are able to secure the services of men fitted to make rates. Surely this great government, with all of its wealth and power, with all that it has involved in protecting the interests of the citizen, can employ equally competent men. And the people of this country, who pay to the railroad companies annually nearly three times as much as it costs to maintain government, are determined that the rates shall be made by some one who will make them fairly and justly.

The right of the government to act has long been settled by the highest authority.

The necessity for the government to act on its own account is too plain for argument.

The duty of the government to act for the protection of the citizen in every town and hamlet of the country is everywhere manifest.

No half way measure will serve. No law full of ambiguities, to be wrought out into court decisions, repeating the sickening experiences suffered with the Interstate Commerce law, will settle anything. The people of this country are not to be tricked or cajoled or baffled for another quarter of a century. They are coming to have a very clear understanding of their rights. They are manifesting an exercise of independent judgment in the matter of nominations and elections never before witnessed since the organization of political parties. They will not be trifled with. They will secure legislators, state and national, who will serve them.

The same obligation rests upon the federal government with respect to interstate commerce, and the state government with respect to state commerce. They must act independently. Neither can afford to wait for the other. If one fails to meet the full measure of its duty to the citizen, that must not be made an excuse for the other.

The federal government is great and powerful. It can secure the services of competent men. It can employ as many as may be required to protect the interests of the business and the people of the country. The present commission, composed of able and experienced men, should be clothed with authority to supervise services and establish rates. If it is necessary to divide the country into districts and increase the commission, placing each district under the control of a given number of commissioners, it should be done.

The commission should have power to correct a rate or establish a rate upon its own motion. Its order establishing a rate should at once carry the rate into effect, to continue until such time as the commission shall otherwise order, or the court of appeals otherwise determine, if an appeal should be taken.

While it would afford some relief to large shippers, and to special lines of traffic between large commercial centers to limit the action on the part of the commission to cases where complaint is made, it would afford little or no relief at all to the great body of the people of the country composing the small shippers and the consumers. They pay in the end the great proportion of all freights. The manufacturer advancing the freight charges it to his jobber, the jobber charges it over to the retail merchant, and the retail merchant passes it on to the consumer. Excepting as the manufacturer or jobber or merchant is interested in a reduction to secure an equality of rates with competitors, they have no interest in the freight charge whatever; and if rates are equitable as between them and their rivals in business, it is of little or no consequence to them that the rate is a high rate. It is from the shippers that we so often hear that the amount of the rate is not so important as the equality and stability of rates. Of course, the amount of the rate does not greatly concern the shipper.

It is of consequence to the consumer. The great body of the people of this country never pay a freight bill to a railway company direct. They are nevertheless the ones who pay the amounts which make up the enormous receipts of the railway companies. They pay the freight when they buy lumber and coal and other supplies. The steadily advancing freight charge is a matter of vital importance to them in the ever increasing expense of living. It falls upon the consumer more heavily than any one else in the country. They are in no position, however, to file complaints with the commission, first, because upon each article the overcharge stands by itself and is not sufficient in amount to warrant the expense necessary to enter upon such a contest, and, further, because the consumers have no knowledge of the amount of the overcharge. The lumber or coal or merchandise comes to them at a round cost price, and they have no information upon which to separate excessive freight charges from the total cost. As to them, then, no law which limits relief to cases of complaint only, will be of any benefit whatever. If any one is to be protected, surely it should be those to whom the reduction would be a matter of some importance in the domestic economy which they must practice in all things. No legislation which leaves them out would be just. The consumer has waited long and patiently. The legislation which is to stand for any time must be broad enough in its terms to cover him as well as the shipper.

It is not necessary to say that the undertaking is too great. No other duty which the government owes to the people and this country is more important than that pertaining to a control of transportation; and if it were necessary for the government to install a government official in the traffic department of every important railway office in the United States, it should meet and discharge the responsibility.

It is time for determined, concentrated effort on the part of all the people of this country. They can easily control if they will but move, and move all together. They have a brave, able and progressive friend in President Roosevelt. He has declared for them. He can not be misled. He will not compromise. At the beginning of this congress he said in his message:

"The government must, in an increasing degree, supervise and regulate the work of the railways in Interstate Commerce; and such increased supervision is the only alternative to an increase of the present evils on the one hand, or a still more radical policy on the other. In my judgment, the most important legislative act now needed as regards the regulation of corporations is this act to confer on the Interstate Commerce commission the power to revise rates and regulations, the revised rates to at once go into effect and stay in effect unless, and until, the court of review reverses it."

No utterance made by a president in many years has called for higher courage, or carried hope to so many struggling business interests in the smaller cities and towns of the country. Thoughtful men everywhere are strengthened for the great contest which is coming on.

In conclusion, then, let it be remembered that the plan developed and consummated in building up the anthracite coal trust, the grain trust and the meat trust is indicative of the power of the railroads in combinations. There is not an important trust in the United States which does not have the assistance of the railroads in destroying its competitors in business. The limitation and control of these public service corporations within their legitimate field as common carriers is of primary importance in the practical solution of the trust problem which confronts the people of this country. It is manifest that any trust legislation, to be effective, must go hand in hand with a control over railway rates by the federal government on interstate commerce, through an enlargement of the powers of the Interstate Commerce commission, and a like control of railway rates on state commerce by each of the states through a state commission. Added to this, the railroad companies must be prohibited from using the extraordinary powers conferred upon them by the state for any other purpose than conducting efficiently and impartially the transportation business for which they were organized.

When we consider the magnitude of the railroad question and the industrial question, and their combined influence upon industrial and political independence, it becomes apparent that it is impossible to overstate or exaggerate the dangers with which we are menaced. These great combinations of wealth, owning most of the natural produce of the earth, controlling what they do not own, created and nourished by the railways and in combination with them, are already making their powerful influence felt in municipal, state, and national legislation. More than all other national questions with which we have to deal should this question be placed above party consideration. The sentiment of the American people is unanimous that it should be solved, not in any spirit of blind, irrational prejudice, but with an enlightened public policy that employs all the power lodged in state and federal government against the wrongful usurpation of the rights of the people.

CONTROL OF RAILWAY RATES.

BY CHARLES A. PROUTY.

[Charles Azro Prouty, lawyer and member of United States interstate commerce commission; born Oct. 9, 1853, at Newport, Vt.; he was graduated from Dartmouth in 1875, and during the following year was assistant to Prof. S. P Langley, at Allegheny observatory; after teaching several years he was admitted to the bar in 1882, practicing at Newport for the next fourteen years; in 1888 he was elected to the house of representatives of Vermont, and from 1888 to 1896 was reporter of the decisions of the Supreme court of Vermont; in 1896 he was appointed a member of the United States interstate commerce commission.]

Years ago the English courts decided that if a railway company granted a reasonable rate to one shipper it might lawfully make a lower rate to another shipper of the same commodity. To-day the doctrine of this decision is universally repudiated. All persons are of one mind that every shipper is entitled to the same rate. The ordinary means of preferring shippers in the past has been by the payment of rebates, and it is agreed upon all hands that this must stop. The public demands that it shall. The interest of the railway requires that it shall. The injunction and the Elkins bill have already gone far toward accomplishing this most desirable result. The law must be amended. It must include the terminal railroad, the private car, the elevator. The accounts of railroad companies must be kept under the direction and supervision of the government, and their books must be at all times open to public inspection. I have sometimes thought that it might even be necessary for the government to appoint the person who receives and disburses the money of these public servants. But the thing aimed at is susceptible of being done, and in the present state of public sentiment is reasonably certain to be done.

Monopolies have been odious to the law ever since there was an English common law. They are especially odious to the American people. Just what is the evil of monopoly? Minor evils there are, but the fundamental wrong is this: that it permits the owner of the monopoly to take from those who are dependent upon the monopoly more than a just compensation for the articles sold or the service rendered. This produces injustice and inequality in the distribution of wealth, which leads to the gravest social and political results. By the building up of enormous fortunes, by placing in the hands of single individuals the tremendous power which such fortunes carry with them, is set in motion a train of circumstances which may finally reduce a people to moral and industrial servitude.

Now, in this aspect there is no trust, no monopoly which is so far reaching so all pervading, as railroad monopoly. For there is no article and no service which enters so universally into the necessaries and luxuries of life as railroad transportation. There is no other monopoly which takes the pennies from the pocket of the poor man, puts together these pennies into an enormous aggregate and deposits them to the account of the multi-millionaire so insidiously as does the railway charge.

Not only do our railroads constitute the greatest of monopolies themselves, but they are, more than any other cause, responsible for the existence of other monopolies. It is familiar knowledge that a slight advantage in the freight rate may be sufficient to drive every competitor out of business. In the past this advantage has been accorded largely through the payment of rebates. That has largely ceased, and will, in my opinion, cease altogether; but there may be, and there are, discriminations in the published tariff itself which are as deadly as those arising out of a departure from that tariff. These discriminations exist in great numbers to-day, and they will multiply in the future unless checked. The identity of interest between our great industrial monopolies and our railroads is becoming such that they are operated for the mutual advantage of one another.

Mr. Rockefeller is a most potent influence in the railroad world. The Standard Oil company was nourished upon rebates until it had grown strong. Its boast is to-day that it receives no rebates, but discriminations in its favor in the printed tariff take from the pockets of the people and put into the treasuries of that company enormous sums annually.

This is the problem; what is the solution? The natural answer is, dissolve the combination which has been made, prevent further combination for the future.

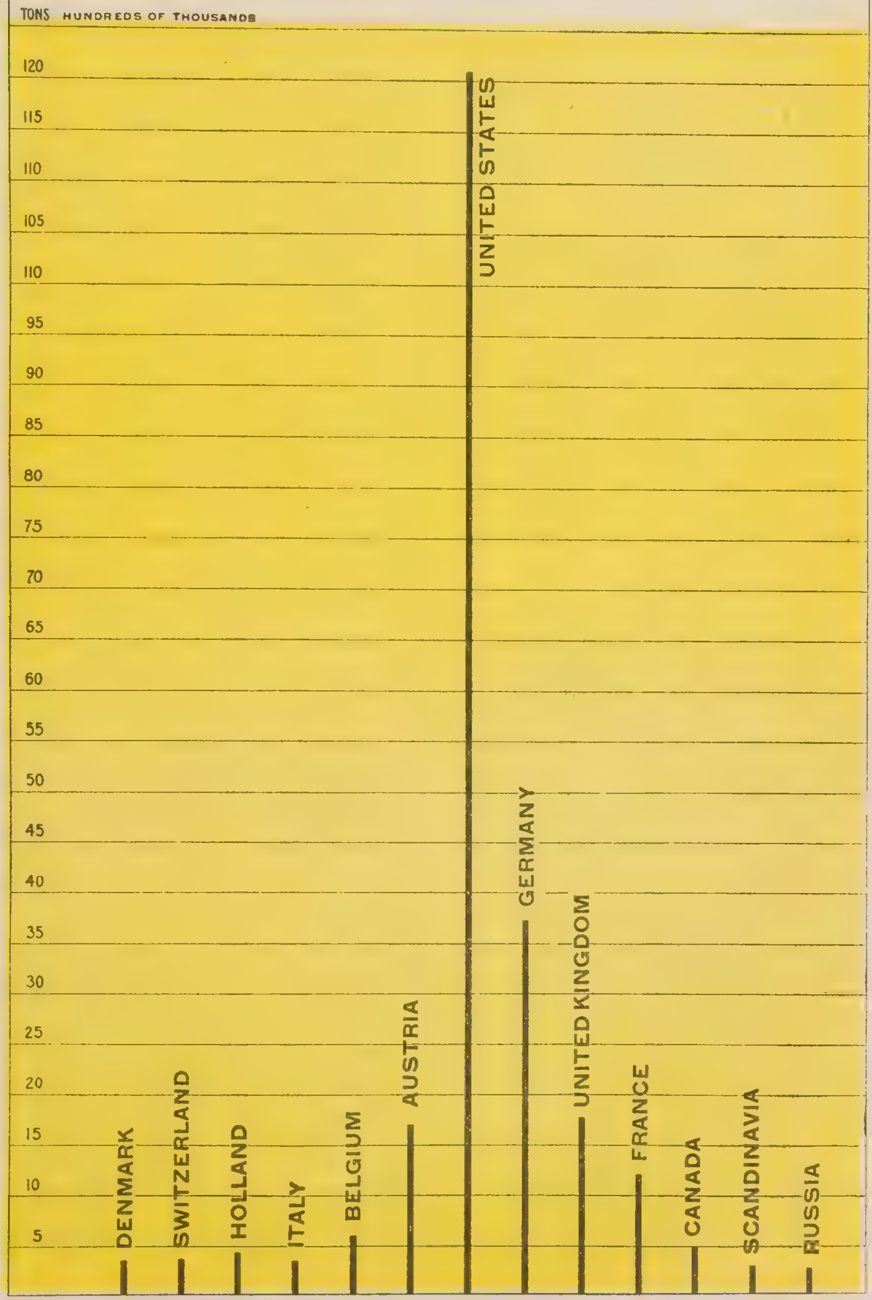
This remedy has been tried, and failed. These combinations have grown up in spite of the most rigorous laws to prevent them. The American people loves competition. It has believed that competition was the best regulator of prices, and it has sought to apply that principle to the regulation of railroad rates. In this legislators and courts have been in hearty accord. There was the act of 1887 against pooling; there was the anti-trust act of 1890 against the fixing of rates by agreement. There were the trans-Missouri decision of 1897, the joint traffic decision of 1898, the Northern Securities decision of 1904. In spite of statute, in defiance of court decision, the monopoly is here.

It is not my purpose to criticise the moral or the legal quality of these transactions. I simply wish to call attention to the fact. It is a fact which can no longer be gainsaid that competition in railway rates has practically disappeared. There still remains in many instances competition in service; there may be an occasional rate war, of which the recent disturbance in grain rates furnishes an illustration. But that is warfare which benefits nobody, which results in no permanent reduction in the rate, the only effect of which is temporarily to disturb those business conditions which ought to be permanent. I deny that railroad competition can ever justly regulate railway charges. It may force down such charges to a point below what is reasonable; it has done so in this country in many instances in the past; but, whatever its effect has been, whatever its effect might be if it could be made operative, it has gone, and never can return.

When the interstate commerce commission was prosecuting its inquiry into the Northern Securities combination Mr. Harriman was asked what remedy a shipper could have against the imposition of an unreasonable railway charge, and his answer was that he might bring suit and recover his damages. Manifestly such a remedy is practically worthless. Take that rate which is of most consequence to the agricultural west—the grain rate. In the last six years the cost to the

RAILROADS OF THE WORLD—1906

FREIGHT TONNAGE



farmer of moving his grain to market has probably increased five cents a hundred pounds, an advance which in the aggregate amounts to millions of dollars annually. Assume for a minute that this advance was unjust, what suit could redress the wrong? Who is injured? Is it the farmer who produces the grain or the mechanic who eats it? Who shall bring the suit? Clearly, the man who pays the freight and is alone entitled to sue and recover the excess has lost nothing by the transaction. He is the middleman who buys and sells upon the rate, whatever that may be.

In case of discrimination the lawsuit is even less effective because the damages are more difficult to locate and ascertain. The effect of a freight rate is all pervading. It finds its way into every part of the social fabric; its result cannot be located. In the very nature of things there is one way, and only one way, in which the wrong can be corrected, and that is by compelling the carrier to charge a proper rate in the first instance. This has been often explained and is universally understood. I refer to it only to make my statement of these fundamental principles complete.

It has been established by the decision of courts without number, including the highest federal tribunal, that the right to apply this remedy exists in the government. With respect to traffic entirely within the limits of a single state this right inheres in the single state. In case of traffic passing from one state to another this right has been delegated by the states to the United States under that provision of the constitution which gives to congress the regulation of commerce.

If you ask me what is the remedy for the oil trust or the beef trust or the steel trust I have none to offer. I would make certain that no one of these great monopolies enjoyed over the humblest member of the public the slightest advantage in railway service or railway charges. I believe that this thing would go further toward solving the vexed problem of the control of these monopolies than any one thing which could be done. I would enforce, in so far as may be, the laws which to-day stand upon the statute books against monopoly. I do not believe that there is serious danger of a permanent character under these conditions unless there be a monopoly in the raw material with which labor and capital must work.

When, however, you ask me what is the remedy for railroad monopoly—how shall you prevent that most insidious of all monopolies from unfair exaction—I can give the remedy, a remedy approved by the courts, tested by experience, susceptible of easy application and effective just in proportion as it is effectively applied. The means by which this monopoly exacts or discriminates is the rate, and it is by controlling that rate that the evil can be prevented. You cannot stop the monopoly, but you can regulate it, and thereby cure the wrong.

The one practical remedy is to create a commission of some sort with power to hear complaints and prescribe the rate to be charged for the future when the present rate is found to be wrong.

Observe exactly what the issue is. The proposition is not that the government shall make the railway rates of this country, but simply that when the rate which the railroads have themselves put in effect is found unreasonable that rate shall be made right.

It is urged that this is unnecessary because the men who manage our railroads are public spirited, christian men.

Is John D. Rockefeller a bad man? Does he not lead a class in a Sunday school? Is not his heart warm toward the heathen, but does this afford a reason why laws should not be enacted, if they can be, to prevent his monopoly from oppressing the public? A justice of the Supreme court of the United States is reported to have said that what we needed for the mitigation of trusts and monopolies was not more legislation, but an application of the golden rule. It won't work. Our freight rates would be just as high and just as discriminating if every meeting of a traffic association which fixes those rates were opened with prayer and closed with a benediction.

Let us be honest. Let us admit that the average man, having the opportunity and the brains, would do what Mr. Rockefeller has done. Let us be sensible. Let us recognize the fact that human nature is alike the world over: that man, having the power to take unto himself, will do so, even at the expense of his fellow men.

It is earnestly insisted that any attempt to protect the public by the prescribing of a railway rate for the future is the grossest paternalism. The dictionary affords no very satisfactory definition of that word paternalism. As used in this connection paternalism seems to be any legislation intended to prevent effectively a monopolist from stealing all he can and keeping all he can steal. The true function of government is to afford each man a fair chance, not to compel my brother to give me bread of which I eat, but to furnish me a just opportunity to compete with him. Any law or any condition which enables my brother to take from me unjustly is wrong, and there is no higher function of government than to correct that wrong. In our land to-day railway transportation is the life blood of commercial activity. No industry and no locality can flourish if that vital fluid be contaminated. The government has not discharged its duty until it eradicates every taint. If it be paternalism to prevent the railways of this land from preferring the Standard Oil company to its competitor in the only possible way in which that can be done, then I am for paternalism. If it be paternalism to prohibit the $12,000,000,000 which are to-day invested in our railways from unjustly preying upon the remaining billions which have come to be at their complete mercy, then paternalism to that extent is my creed.

The railroads are sending out tons of matter showing the amount of railroad bonds and railroad stocks held by the savings banks, the trust companies, the insurance companies and such like of this country. What does all this mean? It can only mean when put into words that a government tribunal endowed with the right to fix a railway rate would make that rate so low as to impair the value of railway stocks and bonds. With reference to that suggestion two things should be said.

First—If that tribunal were so disposed it could not seriously impair the value of these securities. The fourteenth amendment to the constitution of the United States gives railroad companies absolute protection against such action by the legislative branch of our government or any commission.

Second—Suppose this tribunal could confiscate the railway property of this country, why should it desire to do so? It will not be a body of anarchists. There is no reason why its members should not be as conservative as those of any tribunal. Why should they make an onslaught on railroad investments? Personally, I believe that our railways should be allowed a fair return upon their legitimate investment. I believe it would be the height of folly to attempt to compel them to charge rates not yielding a fair return. When Mr. Hill builds a railroad from the head of Lake Superior to Puget sound he is a public benefactor. He may not be actuated and he is not actuated by motives of charity, but the result is none the less a public benefit. He deserves a rich reward. Mr. Hill has said in testimony before our commission that 7 per cent upon a railroad investment was enough. Personally, I would not object to Mr. Hill earning, if he fairly can, a return of 7 per cent upon every dollar honestly invested in the Great Northern railroad and its equipment, but when he asks to earn 7 per cent not only on the money which actually went into that enterprise but upon millions which he has created out of the ambient air, I do object.

The proposition of President Roosevelt can affect no honest railway investment. Whether it would tend to prevent dishonest manipulation remains to be seen. It ought to and it might. To my mind it is only the beginning of what should be done. When no railroad can be built unless public necessity requires it, and when no railroad stock or bond can be issued unless it stands for an honest dollar actually invested, then, and not until then, can the people of this country have legitimate protection from the imposition of illegitimate transportation charges.

It is fortunate for the American people that at this juncture there stands at the head of this nation a man with the ability to see and the courage to act. The president's position has been criticised as an impulse. Upon the contrary, it was only after long and careful consideration that he reached this conclusion. His position is not radical; he proposes the very least that can be done.

GOVERNMENT OWNERSHIP OF RAILROADS.

BY MARTIN A. KNAPP.

[Martin Augustine Knapp, chairman of the Interstate Commerce commission; born Nov. 6, 1843, at Spafford, New York; was graduated from Wesleyan university, Connecticut, in 1868, and the following year was admitted to the bar of New York; in 1891 he was appointed a member of the Interstate Commerce commission by President McKinley and has been reappointed by each successive president until 1898 when he was made chairman of the commission.]

Copyright 1902 by American Academy of Political and Social Science

The object of this paper is merely to outline, without elaboration, some of the arguments for and against the public ownership of railroads.

For the government of the United States to acquire the two hundred thousand miles of railways already constructed, undertake to conduct their vast operations by direct agency and extend the service with needful rapidity, is a project of such colossal import as to incline us to place it quite outside the range of probability. Nevertheless, it cannot be put aside as a purely speculative problem, for already there are many ardent advocates of the policy. In the rapid advancement which displays itself on every hand, not only in the methods of industrial production but in the aims and aspirations of our people, no one can tell how soon we may encounter a widespread and insistent demand for the public acquisition and management of our entire railway system. Moreover, as the nature of transportation is more clearly perceived, and views enlarge as to the functions which government may usefully exercise, it is to be expected that the argument in favor of railway nationalization will become more attractive and convincing. Private opinion and judicial utterance agree that railroads are public highways, having the same essential relation to social order as the streets and avenues which have been dedicated to public use and always controlled by the state as matters of primary and common concern. Therefore, public ownership and operation of our railways is chiefly important in its economic aspects; it is simply a question of expediency.

What may be called the political objection is naturally the first to occur. This objection takes a twofold form. In the first place, it is said that the public ownership of railroads is opposed to the traditional policy of our government and the historic development of its institutions. While the doctrine of laissez faire was not, even at the outset, fully adopted, still the general sentiment of our people has deprecated the extension of state functions and discouraged any radical inroad upon spheres of action occupied by private enterprise. Besides, it is claimed that such an enormous increase of public activities would overtax the power of successful management and bring about a serious disproportion between public and private operations. To say nothing of the difficulties involved in the acquisition of these properties, the task of their administration would be so tremendous, and so liable to be poorly performed, as to endanger the business balance which now seems fairly well maintained.

The weight of this objection is conceded, the satisfactory answer to it not easily made. We hardly see how the roads could be taken over gradually, thereby allowing for growth of experience in unaccustomed duties; apparently the entire system would have to be acquired at once, or within a comparatively short period, without time for adequate preparation. Still, we are not quite willing to place limits upon the ability of a people so intelligent and resourceful as our own. We may well claim that they have proved themselves equal to every demand, and that even this gigantic task is not beyond their capacity. The enlargement heretofore made in the field of public performance has been justified by results, and it may be confidently asserted that our government has up to this time assumed no function or activity which we would consent to have it abrogate. Nor can we deny as an abstract proposition that a self-governed people, worthy of their heritage and opportunities, may best realize their ideals by collectively doing more and more of the things which affect the public welfare.

The other form of this objection is the danger of abuse through party control of such vast properties, representing so large a share of the wealth now in private hands, and the enormous voting strength of a million or more of railway employees. That this objection is a serious one cannot be denied. Such experience as we have had is hardly sufficient to relieve our apprehension. True, there is now a considerable army of government employees, and their influence upon the results of elections is scarcely appreciable; but what would happen, for the time being at least, if all the railway employees of the country suddenly became government servants, no one can safely predict. We may believe, however, that the nature and magnitude of their work would so emphasize the necessity of stringent civil service rules, and popular sentiment would so emphatically condemn any attempt to use the railway employees for political purposes, that the danger in this direction would be far less than many imagine and would not be long in disappearing. For myself, I do not regard this objection as serious enough of itself to decide the question in favor of private ownership.

This view is confirmed by the fact that railways now exert a powerful and often decisive influence upon public affairs. That influence is not confined to the control of votes upon election day, but extends to the conduct of primaries, the organization and sometimes the corruption of legislative bodies, the selection of appointive officials of every grade, and the enactment and administration of local, state and national laws. It is always alert, aggressive, selfish; it is sometimes unscrupulous and demoralizing to the last degree. We may well question whether government ownership would under any circumstances introduce into American politics a more vicious or dangerous force than railways now exert.

It goes without saying that there are serious evils connected with existing railway methods. The roads have been built by private capital and conducted for the most part as private enterprises. The principle of competition has been upheld by public opinion and enforced by state and national laws; yet the obvious results of that competition are discriminations which favor the few at the expense of the many, and which are a serious and often fatal disadvantage to those who are denied favors which others enjoy. Capital always takes advantage of competition, and nowhere is that advantage greater than in the use of railway facilities. Almost any price may be profitably paid to secure immunity from practices which now prevail. Government ownership would undoubtedly remove these discriminations. It would insure open and stable rates, applied to all alike without variation or exception. The price of transportation would be as certain and unquestioned as the price of postage stamps. There might be some frauds in underbilling, false description of property, and the like, as there are frauds upon the customs and internal revenue laws, but adequate penal provisions and vigorous prosecution of wrongdoers would reduce offences of that character to a minimum. It would be a question of only a little time when all secret and preferential rates would disappear and equal treatment be accorded for equal service in all cases. This would be an immense gain, and herein lies perhaps the most persuasive argument in favor of public ownership. As against this, however, there would unavoidably be a certain rigidity of rates which would to some extent interfere with the ready adjustment of charges to changing commercial currents and the varying conditions of supply and demand. It is not probable that under a system of public ownership there could be quite the same adaptability of rates to business requirements as obtains under private ownership.

In addition to uniformity and equality of charges which would result from government ownership, the advocates of that policy claim other advantages which deserve consideration. One is the security of capital which would be invested in the obligations issued to purchase the roads. There is something to be said in favor of a national debt when the creditors are citizens of the debtor state and the holders of its promises to pay. As the basis of currency issues, as an investment for savings banks, trust companies, estates, and the large class of persons who are not fitted for active employment, there is apparently nothing better than government bonds. Indeed, it is difficult to provide a substitute security for these various and important purposes and others of similar character. If the railroads were self supporting, that is, earned enough to pay the interest on their cost, provide for their running expenses, maintenance, extension, and improvements, with rates at least equally as low as would be secured under private ownership, the obligations incurred in acquiring the properties, whether in the form of bonds or guaranteed stock, would meet an increasing demand and prove a safe and stable foundation for our financial system.

But more than this, the elimination of railway securities as they now exist would, it is claimed, produce much indirect benefit. These securities are at present among the principal subjects of speculation. The prices at which they are sold constantly fluctuate and often represent something quite different from the actual value or earning capacity of the roads. The gambling instinct is stimulated by sudden and extreme changes in quotations, with the consequent opportunity to make large gains quickly, while the corresponding losses are equally sudden and disastrous. To get rid of all this manipulation, to withdraw these securities from the exchanges and stop all speculation in railway shares, would seem to be a distinct advance in the direction of business morality. When fortunes could no longer be made by dealing in this class of stocks, the capital and ability now devoted to that pursuit would be turned into more legitimate channels. It might prove an object lesson of immense value. We scarcely realize the demoralizing effect of this many sided lottery. The fact that fortunes are quickly acquired in this way excites the passion for gain and breeds discontent with the plodding methods of slow accumulation by diligent labor and constant economy. The moralist, as well as the economist, may find something worthy of reflection in the point here suggested.

It is further claimed that public ownership would secure lower rates of transportation. Theoretically, this is true, but whether that result would be realized as a matter of practical experience is more than doubtful. It seems to be the case everywhere, and is likely to be for a long time to come, that government service costs more in proportion to the work performed than private service. It is quite conceivable that the railroads of this country could be made to pay interest, say from 3 to 4 per cent, on their fair valuation, in addition to all their expenses, with a general scale of rates somewhat below the present standard. Given the same efficiency of management, the same energy and economy of administration, the same basis of wages and salaries as obtain under private ownership, and a considerably smaller charge than is now paid per unit of service would be sufficient for financial solvency. But this assumes a state of things not likely to exist if the railroads were operated as a government function. Any expectation to the contrary is not warranted by knowledge of what has generally characterized the various branches of government service.

Public ownership would doubtless mean higher wages and shorter hours of employment, but this again would mean an increased number of servants, adding materially to the cost of maintenance and operation. Upon this point it is often remarked that enormous salaries are paid to railway presidents and other officials, and that outlays of this sort would be stopped because no similar scale of compensation would be paid to government officials performing like duties. This argument, however, is rather specious and is used mainly by those who have made no calculation to see how small a figure it cuts in dollars and cents. Without having made the computation, I venture to say that if all railway salaries above $5,000 a year were discontinued the saving would not be appreciable in the price of a railway ticket or the cost of moving a hundred pounds of freight.

With reference to future construction and the extension of railway lines a word may be properly said. That there have been many instances of needless duplication of railway lines, actually or nearly parallel, is perfectly well known; but government ownership would not correct mistakes that have already been made in that regard. The roads would remain where they were built and their continued operation would practically be necessary. In constructing additional roads a more rational plan might be followed and a repetition of past follies avoided. But here again we run against political objections. On the one hand is the danger that too great conservatism would prevail, with the consequent failure to supply extensive and developing sections of the country with needed facilities. On the other hand is the danger that there would be an overproduction, having reference both to cost and to public requirements. More than this, the building up of important lines, or their extension in certain sections, might become a political issue. We cannot be sure that the development of our railway systems by the government would be guided by needful wisdom and fairly balanced as between the demands of localities and justice to the taxpaying public.

On the whole, we may conclude that the distribution of our railway mileage, both with reference to territory and population, has been fully as rapid, judicious, and satisfactory as would have been the case if the government had constructed the roads and determined from the first their number, character, and location.

In this connection I suggest a phase of the subject which has not apparently received much attention. It is not enough that open rates are published and rigidly observed. That of course insures equality of treatment as between individuals in like situation—a result that would certainly be secured by public operation of the roads. But there is another aspect of the rate question which presents far greater difficulty and which is wholly independent of railway ownership. The fair adjustment of rates as between different communities and different articles of traffic is a matter of the highest consequence, because upon that adjustment depends the most commanding commercial interests. If the state owned the roads all secret discriminations would disappear, but then as now the question would arise, for instance, how rates on wheat should compare with rates on flour; how rates on dressed beef and packing house products should compare with rates on live animals; how rates on grain and grain products, produced in the great middle west, to north Atlantic cities should compare with rates on the same articles to ports on the Gulf of Mexico.

These and an endless variety of similar questions would demand solution under government ownership precisely as they demand solution at the present time under private ownership. And the danger is that those questions would become political issues to be settled by the action of the majority party. I can see how railway officials and employees, all being government servants, might be kept out of politics, or at least prevented from exercising any undue or improper influence upon policies and elections. I can see how a trained and efficient force might be equal to the complicated task of management and operation. I can see how the financial difficulties could be overcome and rates so adjusted to needed revenue as to save the people from any indirect taxation for railway support, and at the same time give them extremely cheap transportation. But I have grave apprehension along the line now suggested. More and more as modern industrial methods are applied and perfected, as business is conducted upon an enlarging scale with a narrowing margin of profit upon each unit of production, more and more will the question of relative rates become controlling.

Shall coal be taken to Chicago from Indiana or from West Virginia? Shall iron and steel products be manufactured in Pittsburg or in Cleveland? Shall export traffic leave the country by way of New York or New Orleans? Shall wheat be made into flour at Minneapolis or Buffalo? Shall certain localities be supplied with oranges from California or from Florida? Shall sugar be made from beets grown north of the Ohio and Potomac rivers, or from cane in Louisiana or Hawaii, or Cuba and Porto Rico? Will the Pacific coast jobbers who are reaching out for the trade of the Orient get their supplies from the Mississippi valley or from the Atlantic seaboard? Will those supplies be carried by rail or by water? These and a thousand similar questions will be largely answered by the rates fixed for carrying the traffic. If the government owns the roads and operates them, congress may fix the price of transportation as it now fixes the price of postage or the internal revenue tax on any article; and it is conceivable that, as the result of an election or in the redemption of party pledges, a system of rates might be adopted which would enormously benefit one or more sections of the country whose representatives combine to that end, while placing other sections at serious disadvantage. In this direction I see the greatest difficulty, and it is on this ground, more than any other, that I should regret to see the government take up the business of owning and operating our railway lines.

There is another and distinctly economic phase of the subject from which arguments may be drawn both for and against the nationalization of railways. Indeed, it leads to the most interesting reflections because of its wide significance and permanent character. On the one side it is said that to withdraw this immense industry from private enterprise, and make our transportation a government monopoly, would seriously restrict the field of private activity and in a way leave insufficient scope for individual effort and achievement. It is opportunity that furnishes inducement to action, because of the rewards that may be secured; and where opportunity is lacking there is corresponding temptation to idleness and ease. When we consider how many men win wealth and prominence in connection with the building and operation of railroads, or through their relation to reorganizations and consolidations, we can see that there is an element of disadvantage to the ambitious, not to be lightly regarded, in taking so great an industry from the field of private performance. What the actual effect would be we can only conjecture.

Against this, however, two things may be said. First, as a practical matter, we may believe that ample opportunities for success would be found in other directions. Our territory is so great, its resources so varied and exhaustless, there are so many new things to be done, so many prizes to be won in other spheres of activity, that the withdrawal of all railway operations from the field of private enterprise would not seriously handicap the determined and capable. Indeed, as incidental to this point of view, it may be remarked that the stability and certainty of transportation charges under government ownership would give a freedom to individual effort which very many under present conditions do not enjoy. If the facilities of rail conveyance were available to all persons on like terms, so that the burden of transportation rested with equal weight upon competing producers and dealers, there would be a liberty of private action which often does not now exist, for the like enjoyment by all of this public service would remove the bonds by which many an industry is to-day hampered and many an occupation deprived of its rightful privileges.

But there is a further and more important consequence to be taken into account. We are constantly reminded of the gross inequality in the distribution of wealth, and see in the facts of everyday life much cause for dissatisfaction in this regard. We feel tolerably sure that a more equable division of property would be a great social and economic benefit. If this be desirable, as I think it is, how can it be brought about except by withdrawing from private enterprise those activities of a public nature whereby great private fortunes are and have been acquired. There is no honest way of getting rich in connection with an industry conducted by the public. If the railroads were acquired by the state and conducted as a government monopoly the opportunity for money making in that field would of course disappear. Granted that this might work in some cases against individual success, yet on the whole might it not prove a needful corrective of present tendencies, and thus indirectly but certainly lead to a better because more even distribution of the nation's wealth?

Consider, for example, what has occurred within the last few years in the street railway service of cities. The recent substitution of electricity for animal power furnished an opportunity which a few foresaw, and they have been greatly enriched by exploiting a public franchise. That the public has had the benefit of much better service without increased cost is beside the present question. The point is that had those franchises not been granted, had they remained the possession of the public, the great fortunes made in street railroading would have been impossible. It may be better as it is; the municipal ownership of street railroads might not have been a financial success or a public blessing, but a small group of persons would not have been able to accumulate unusual wealth. If, in the long run, it makes for the general welfare to prevent the quick and easy making of private fortunes in connection with a public service, what other course remains except to emancipate all forms of public service from the domain of private enterprise.

If we test the utility of public ownership by the experience of other countries, we find little that is convincing either one way or the other. On the whole the tendency is strongly in that direction. And this tendency, it is interesting to observe, is quite independent of the form of government. For instance, there is Germany, which the ordinary person regards as the nearest to a monarchy of any great modern state, which already owns and operates a large portion of its railways and is apparently aiming to still further extend its railway operations; and right alongside of Germany is little Switzerland, which we picture to ourselves as about the most democratic of modern governments, which has recently acquired all the railways within her territory and is to conduct them as a government service. The step was taken only after long deliberation and under a proceeding which reflected the unquestioned preference of the Swiss people.

From such countries as Australia and New South Wales conflicting accounts are received, varying largely, it would seem, from the point of view and preconceived notions of the observer. I have had occasion to meet men from both those countries who are thoroughly well informed, not only as to the operation of their railroads but as to the sentiment of their people, and I was assured that the idea of discontinuing public ownership and allowing the railroads to pass into private hands would find no support in public opinion or be regarded as among future possibilities. It is true, the conditions existing in other lands are quite different from those encountered here. This is so not only as to the character of the population and industries, but also by reason of the traditional sentiment and attitude of the people towards their governments. In England, as is well known, the geographic and other conditions are quite unlike those existing here. More than that, there has been in England from the beginning a more rigorous control of railways than in this country, while various causes have brought about to a great extent a division of territory between different railway systems, so that competitive forces have been kept under efficient restraint. The discriminating practices which are here so prevalent and alarming are there virtually unknown.

It is a great question, one upon which the last word has not by any means been said. That it will be more and more discussed I am very certain. That it will become an early political issue I do not expect and assuredly do not desire. But as was remarked at the outset, no one can tell how soon it may be forced to the front and absorb the attention of the country beyond all other matters of public concern.

One thing an aroused and dominant sentiment will surely demand, and that is the doing away with those vicious discriminations which have characterized and often disgraced our railway operations. Such offences against right and justice will not always be tolerated. If consolidations and unified management bring open and reasonable rates, if more intelligent and adequate laws aid the elimination of abuses and give success to the work of public regulation, the agitation for state ownership will not for a long time make perceptible headway. That is the outcome which seems plainly the most desirable. If it can be secured through associated action and efficient supervision, the public will be satisfied to leave the railways in private hands; but if abuses continue and chronic evils prove incurable by methods we much prefer to use, then there will be no alternative except to acquire and operate the railways as a government function. If regulation fails, public ownership will be the next and early resort.

RAILROAD ORGANIZATION.

BY GEORGE T. SAMPSON.

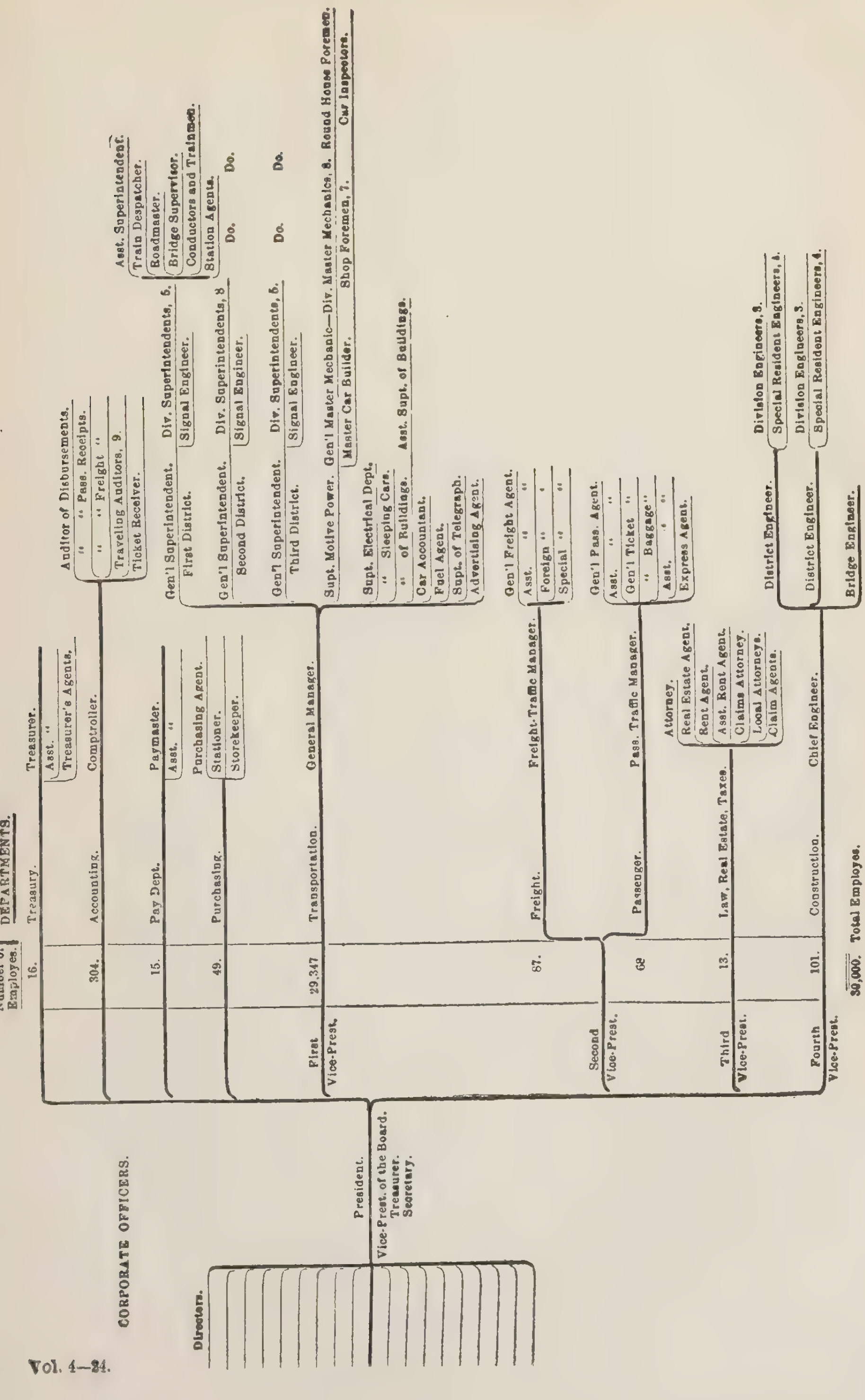
[George T. Sampson, division engineer, New York, New Haven and Hartford railroad, in charge of Providence and Midland divisions; he was born October 1, 1855, at Medford, Mass.; was member of the first city council of Medford; contributor to the Journal of the Association of Engineering Societies.]

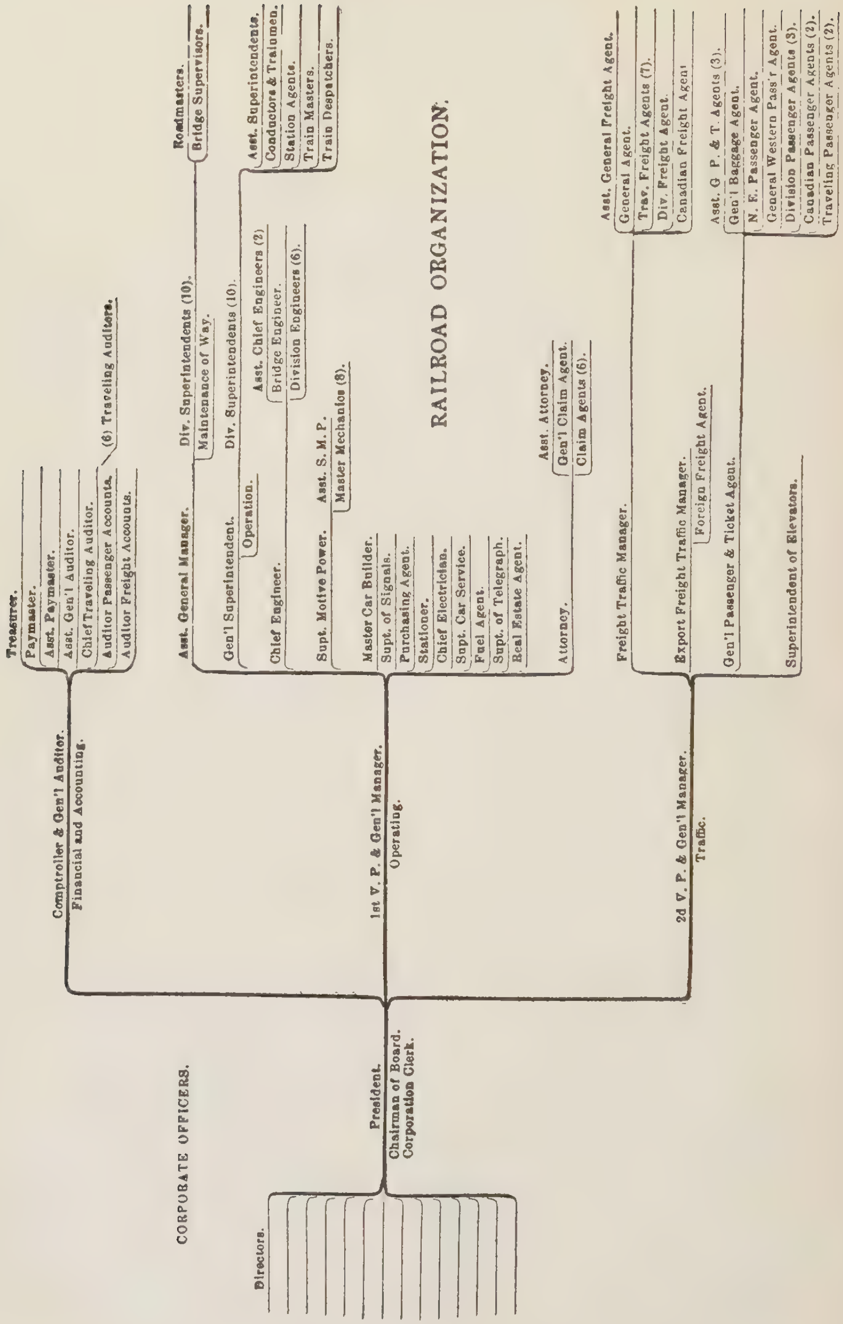
Railroad organization is a subject on which new chapters may be written and required to describe the conditions of each new year, and I may say month, of the present times. The recent years have marked an epoch in railroad history when consolidation has been the rule in our country, when no scheme for uniting different companies seems too great to be considered and none too great to be consummated. It appears to me as one of the noticeable results of the greater organizations, while in part it may perhaps be considered as a natural and proper growth and improvement in railroad methods, that while the duties of the great majority of men employed in railroad service continue on the same general lines, with responsibilities much the same as in years past, there is required of nearly all a better education and the performance of a greater amount of clerical work than was ever expected in the earlier years.

The larger organization requires an additional number of active workers in official and clerical positions not previously considered as necessary, all working in harmony, subject to but one highest in authority instead of working on many independent lines. It is because the one guiding mind at the head must in some way and manner be informed of results attained and work performed by the lowest subordinate that this additional clerical work is required of all, and it is for the collection, compilation and tabulating of the great mass of facts and figures which come from the subordinates into proper shape for the intelligent consideration of the one at the head that the greater corporation needs to employ more clerical assistance and to establish departments with able men in charge in the intermediate positions which were not thought of in the earlier years. It is in these new departments, these intermediate positions, that the greater organizations of to-day become evident and distinctly different from our small organizations of twenty-five or thirty years ago.

Let me here call your attention to plate No. 1, a chart or graphical representation of the various departments required for the operation of one of our larger corporations of to-day, an organization operating about 2,000 miles of located railroad, with total tracks of about 4,000 miles, employing now about 30,000 persons, with annual earnings of about $40,000,000. Notice that this chart shows the numbers employed in each of the departments; that out of a total of 30,000, those employed in the transportation department, the freight department, and passenger department combined, who may be said to be the workers who earn the income, number 29,347 persons, or 98 per cent of the whole. Another 1 per cent, or 304 persons, conduct the accounting department and keep the books, and the remaining departments, whose numbers combined amount to 294 persons, or the remaining 1 per cent, are entrusted with work which requires the direct disbursement of funds or the oversight of expenditures.

Also note plate No. 2, showing an organization operating about 2,250 miles of located railroad, with total tracks of about 4,000 miles, employing now about 24,000 persons, with annual earnings of about $30,000,000. On chart No. 1, I have attempted to show the relation existing between the highest and those officials at the lower end of the list, which may be spoken of as subdivisions of departments, in which a considerable number may be employed and where the official at the head of the same, with well-defined title and duties, is charged with the execution of work controlling the receipt or disbursements of funds or material for which he may be required to render an account and held responsible for the accuracy of the same. It shows how these lowest officers are related and connected to the highest through the intermediate officers.


Directors.
CORPORATE OFFICERS.
President.
Vice-Prest. of the Board.
Treasurer.
Secretary.
Employes.
DEPARTMENTS.
16.
Treasury.
Treasurer.
Asst. "
Treasurer's Agents.
304.
Accounting.
Comptroller.
Auditor of Disbursements.
" " Pass. Receipts.
" " Freight "
Travelling Auditors, 9.
Ticket Receiver.
15.
Pay Dept.
Paymaster.
Asst. "
49.
Purchasing.
Purchasing Agent.
Stationer.
Storekeeper.
First Vice-Prest.
29,347
Transportation.
General Manager.
Gen'l Superintendent. First District.
Div. Superintendents, 5.
Signal Engineer.
Asst. Superintendent.
Train Despatcher.
Roadmaster.
Bridge Supervisor.
Conductors and Trainmen.
Station Agents.
Gen'l Superintendent. Second District.
Div. Superintendents, 8
Signal Engineer.
Do.
Do.
Gen'l Superintendent. Third District.
Div. Superintendents, 5.
Signal Engineer.
Do.
Do.
Supt. Motive Power.
Gen'l Master Mechanic—Div. Master Mechanics, 8.
Round House Foremen.
Master Car Builder.
Shop Foremen, 7.
Car Inspectors.
Supt. Electrical Dept.
" Sleeping Cars.
" of Buildings.
Asst. Supt. of Buildings.
Car Accountant.
Fuel Agent.
Supt. of Telegraph.
Advertising Agent.
Second Vice-Prest.
87.
Freight.
Freight-Traffic Manager.
Gen'l Freight Agent.
Asst. " "
Foreign " "
Special " "
62
Passenger.
Pass. Traffic Manager.
Gen'l Pass. Agent.
Asst. " "
Gen'l Ticket "
" Baggage "
Asst. " "
Express Agent.
Third Vice-Prest.
13.
Law, Real Estate, Taxes.
Attorney.
Real Estate Agent.
Rent Agent.
Asst. Rent Agent.
Claims Attorney.
Local Attorneys.
Claim Agents.
Fourth Vice-Prest.
101.
Construction.
Chief Engineer.
District Engineer.
Division Engineers, 3.
Special Resident Engineers, 4.
District Engineer.
Division Engineers, 3.
Special Resident Engineers, 4.
Bridge Engineer.
30,000. Total Employes.



RAILROAD ORGANIZATION.

In a paper of this kind it is unnecessary to attempt to detail the duties of the higher officers. The name of the department under their direction suggests in a general way the nature of their work. The chart shows how the several departments are related. When we consider the 2,000 miles and the extent of the territory traversed, the volume of new work that must arise, the relations to be cultivated and maintained with the public and outside interests pertaining to this work, the number of subordinates whose efforts are to be supervised and directed, we realize that their time and attention must be occupied up to the full limits.

In the construction department, which is charged with the duty of building, and to a considerable extent maintaining, the right of way, yards, roadbed, tracks, bridges, buildings, water stations, etc., we see it as the duty of the officer at the head of it to determine upon and direct the preparation of standard drawings and specifications for all materials and mechanical parts which may enter into the same, so far as they can be made to serve the purpose, to inform all the departments interested and his subordinates of these standards; and having decided upon work to be undertaken and having assigned the same among his subordinates, meaning particularly the district engineer and the division engineers under him, we come to an officer in the division engineer who may be said to have work that is to a great extent a regular routine. With certain mileage, or part of the system, assigned to his care, it is his duty, with the assistance of the force under him, to keep thoroughly informed of all the characteristics of his division,—its grades and alignments; its mileage and stations; its right of way, fences and land lines; its record of location and title deeds of land owned; its highway and private crossings; its yards and tracks, with the various patterns of rails, frogs and switches used in the same; to a considerable extent its interlocking systems, signals and buildings; its bridges, with the age, length, strength, kind, condition and pattern of each; its water stations, with the locations and sizes of tanks, pipe lines and water cranes, together with the sources of supply and their capacity. He is expected to have information on all these subjects ready for use at all times on short notice; to keep plans and records perfected and correctly up to date.

In ascertaining and maintaining the maximum clearance section of his line he has a work of no small importance, requiring a critical and painstaking accuracy in inspection and measurements, these to be corrected for rail elevations and curve ordinates; and in making answers to frequent inquiries about the possible movement of rolling stock of unusual size from foreign lines arriving at junction stations.

Added to the work above named, which is largely a matter of maintenance, comes that which is necessary in planning and estimating for additions or changes in arranging for new construction, the specifications, statements of quantities and schedules of materials. When, for work to be performed by company employes, the material needed is to be purchased through the purchasing agent and supply department, requisitions must be written on proper blank forms, so specifying each item in descriptive wording known to the trade that the correct and proper article will be surely procured and delivered by the party who may receive from the purchasing agent the order to supply the goods.

In the matter of accounts approved bills for labor or materials (for freight charges or train expense) must be forwarded to officers next above in rank, with notations on the same clearly stating their distribution under headings or titles of accounts furnished by the accounting department.

From the chart we note the department of law, real estate and taxes, and the corps of officials needed for its work. As the corporation is a creation of the law, so must its administration be conducted according to law, and the necessity is apparent for the employment of those thoroughly versed in its tenets. All other departments need advice and information about the law's requirements and restrictions. All kinds of legal talent are represented in the department, as counselors or advocates in civil or criminal proceedings, or as conveyancers and real estate lawyers.

The corporation pays taxes as found correct, both its state taxes as a corporation as well as the local taxes assessed on property in towns and cities. By force of circumstances largely, rather than from choice, the company is possessed of land and buildings to be cared for and made remunerative; property outside of that which is absolutely necessary for the operation and maintenance of the railroad, and to properly execute its undertakings new purchases are frequent. The real estate and rent agents prove quite as necessary for the company as for any large individual property owner, and they fill an important place in the organization.

The railroad corporation is a target for all kinds of claimants. Its weak and vulnerable points of attack are always exposed to view. The claims presented are of all kinds, honest and dishonest, just and unjust, of both large and small amounts, arising from all imaginable and possible causes. Prominent among them are personal injury cases, the lost or damaged freight or baggage cases and fire damages.

It requires a force of trained attorneys and agents to consider and weigh the evidence in these cases, to sift the false from the true, to decide which shall be settled out of court, which shall stand the chances of trial, and to prepare a case for trial, as well as to conduct it.

The passenger department, in common with the freight department, is distinctly one of the money earners, its important expenditures being practically only those necessary to support its employees in its daily routine, to advertise its line in an enterprising, attractive and progressive manner and to pay its bills for printing. While charged with the duty of maintaining an active and constant lookout for new passenger business, of devising ways and means to secure and accommodate it when obtained, it is also its chief duty to fix the rate or price for passenger travel, to maintain its rates and sell its service at a lawful and reasonable price; and originate and continue in its proper channels the daily system of collection of income, so essential for the life of the corporation and without which it cannot long endure.

Reference to the chart of our sample system shows at the head of the passenger department a passenger traffic manager, and he assisted by one or more general passenger agents, their number depending much on local peculiarities of the line or its traffic; a general ticket agent, a general baggage agent and an express agent. The title of each carries with it a pretty good suggestion and definition of the duties of each.

Without attempting to be too comprehensive in the description of the duties of these officers, suppose we take up as a single subject the consideration of tickets, their issue, sale and collection. Think if you will of the hundreds of passenger stations on a modern system. Consider for a moment the multitude of combinations possible and the large figures resulting if it should be found necessary to furnish a considerable number of tickets for travel from any one station to all others of the system, to say nothing of through tickets to stations on connecting lines. Suppose one single new station should be added to the system, would it not be quite an undertaking and expense to simply get in order and furnish proof for the printer, not only in the preparation of the tickets themselves, but in the revision of the tariff sheets of rates, in the revision of mileage tables, in the preparation of time tables and folders and so forth?

The tickets, having been printed and made ready by the general ticket agent, are by him sent to the station agents for sale, a carefully prepared record having been made of the numbers delivered to each agent and that record also forwarded to the auditor of passenger receipts.

The station agent, on making sales of tickets, sends daily cash remittances to the treasurer, and monthly reports of all tickets sold and prices for same, and tickets remaining unsold, to the auditor of passenger receipts, taking credit for cash paid out for cash rebate checks redeemed. The passenger conductor on his train, having been previously notified of the lawful issue of tickets, recognizes all such when offered by the passenger, collects a cash fare when no ticket is forthcoming, issues to the passenger a special cash rebate check (in such case retaining for himself a duplicate of the same) and daily remits to the treasurer all moneys so received; and forwards to the auditor of passenger receipts all tickets collected and duplicates of cash rebate checks issued, with reports covering the same on proper blank forms.

Following the routine outlined above, the income and earnings of the passenger department are traced to the treasury department, and the record and account of sales are so finally deposited with the accounting department.

The advertising part of the passenger department constitutes no small part of the work in each general passenger agent's office, and while large sums are annually spent in such work, still, like all business which has a healthy growth, there is no doubt of the need for the expenditure. The public wishes to know and needs to know all of the scenic and historic attractions on the line, and numerous pamphlets and books are issued descriptive of summer resorts and places of interest. The public needs to have traveling made easy; needs to have always before them and handy for ready reference leaflets and pocket time tables showing the time for arrival and departure of trains. The issue of these pocket time tables, kept up to date and correct for all changes of trains, for one of our modern corporations annually reaches a number of million copies. So much I may say and more for the passenger department without more than mention of special business which covers the question of arranging prices and accommodations for special excursions, private cars, theatrical troupes, and so forth, which are oftentimes moved over the road on a special time schedule arranged with the transportation department.

The freight department, one of the money earners, starting originally with the simple proposition to arrange for hauling freight short distances between local points on a single system, has grown to an organization equipped for a volume of business enormous in its proportions and far-reaching in its relations. Under contracts and relations now existing between connecting railroads, it is possible to ship property on a single through bill of lading across the continent, from ocean to ocean, and I may perhaps add across the ocean also.

Special freight agents and traveling freight agents are the solicitors for freight to be shipped to competitive points, as well as for new business, paying proper attention to freight claim matters.

The making of freight rates is the duty of the freight traffic manager, and of the general freight agent, under supervision of the former. The division and percentage of through rates is also arranged by these officers. When rates are decided upon, notices of the same in proper form are sent to the accounting department and to all agents at all stations.

The ordinary routine business of the freight department is as follows: A person desirous of forwarding goods presents with the property to any railroad agent an original and duplicate form of shipping receipt, on which the goods are enumerated and described. These are, if found correct, signed by the agent and the original given to the shipper as a receipt and evidence of contract. The duplicate is held by the agent as a forwarding order, and used by him in checking the goods into the proper car, and from it the way bill is written with charges at tariff rates. The agent keeps a press tissue copy of all way bills issued. If made out in season, way bills go forward by the train which carries the goods in custody of the freight conductor.

All agents who write a way bill send a copy of the same to the accounting department, where it is checked as to rates and proportions. In cases of through shipments to distant points over connecting lines, owing to pressure of business and to a desire to make prompt delivery, cars are often forwarded before the way bill percentages are figured out and written in on the way bills. In such cases the way bills are sent by United States mail to the junction point at the first connection with a foreign road via which the goods are routed, where the respective agents take the way bills into account, the receiving agent paying to the delivering agent the revenue earned up to that junction station. A terminal road and station pays all accrued charges, and is reimbursed by collection from the consignee. Settlements with connecting roads at junction stations, or with consignees, may be made daily, weekly, or monthly, as agreed upon. Freight charges are a lien on the goods, and usually collections are made when goods are delivered; but where regular customers are known to be financially all right credit arrangements are not uncommon.

When a shipment reaches a terminal, it is the first duty of the terminal agent to audit the way bill and detect errors either in rates or extensions, as well as to check up the quantity and condition of the goods.

Notwithstanding all systems and care used to detect and avoid errors, they will creep in; and, with cases of accident and injury to goods, it becomes necessary to employ a freight claim agent with a clerical force under him larger than that which is employed to originate and direct the regular work of the general freight agent's office. Claim cases per year count up into the tens of thousands. It is the duty of this office to meet the claimants, to collect all the evidence bearing upon each case and to adjust the same if possible.

In case of through billing, where loss or error occurs at a distant point on a foreign road, it often occurs that the local or terminal road settles with and pays the claimant and collects from the foreign road at fault, being first convinced that the foreign road acknowledges the error and will pay.

This matter of claims is of such magnitude and importance as to cause the organization of the freight claim association, in which the freight claim agents of each represent the interests of their respective roads. Its object is the prompt and equitable settlement of freight claims with claimants and between carriers. It has become an interstate association, including 206 railroads as its members, representing 167,091 miles in the United States, Canada, and Mexico and 5,000 miles of water lines, combining 90 per cent of all transportation lines in North America. Each railroad designates its representative in this association, which formulates and publishes rules for the uniform guidance of each freight claim agent's office.

Freight receipts are forwarded to the treasurer and accounted for to the accounting department in much the same way as has been previously explained for the passenger department, and statements above made about duplicate way bills show how the accounting department can check the accuracy of agents' reports and remittances.

In the transportation department the officer who may be said to be most closely informed in detail of the movement of trains is the division superintendent, acting under the supervision and orders from a general superintendent. He is expected to keep the wheels turning in an orderly manner over the mileage entrusted to his care, and to promptly restore order in each case should disorder arise. He is entrusted with the duty of preparing time tables, of seeing that trains are safely handled in accordance with the same, subject to the standard rules and regulations, and of enforcing the observance of the rules among the employes. Every employe, while on duty connected with trains, on any division of a road, is under the authority and must conform to the orders of the superintendent of that division.

As the division superintendent is entrusted with the safe conduct of the trains, so there is afforded to him, as a means to that end, full control not only of the trains and men employed on them, but also of the right of way, roadbed and its structures, and all employed in their maintenance. In the performance of his duties he is assisted often by an assistant superintendent on lines where business is heavy, and always by a train dispatcher, a roadmaster and a bridge supervisor. The conductors and other trainmen and station agents look to the division superintendent for their instructions in the care of company property, and all matters other than those of income and accounts.

The chief train dispatcher has direct charge, under the superintendent, of the movements of all trains. He keeps posted about the volume of traffic, orders out the motive power as needed and directs car movements accordingly. The trick dispatcher works eight-hour tricks. With the aid of the telegraph he keeps in mind where all trains are, issues orders needed and makes the entries on the train sheet showing their movements. Operators at way stations report trains to him, and receive and deliver orders to trainmen.

The roadmaster reports to and receives instructions from the superintendent. He has charge of the maintenance of the roadbed, culverts, masonry, tracks, sidings, yards, depot grounds, road crossings, and fences, and is responsible for the safe keeping of all material and supplies used in such work. He has full control and authority over section foremen, trackmen, crossing gatemen and flagmen, laborers and construction trains while at work. It is his duty to report to the superintendent the time of all employees under him on proper forms for entry on payrolls, properly distributing their time to the various works in progress for the information of the accounting department, and in similar manner make report and distribution of all materials used. Materials, supplies, and tools are to be carefully inspected when first received and checked by the invoice, making prompt report in case of discrepancies.

The length of line which may be assigned to the care of the roadmaster will vary considerably, according to local conditions and peculiarities, but in a general offhand way it may be talked of at about 150 miles or less. This mileage is divided into sections of about 3 to 6 miles each, and each section given its number, with its limits clearly defined. Each section has its section foreman, and a sufficient number of men to properly perform the necessary work, varying according to the time of year, a rate which averages about one man per mile for the system through the spring months and early part of summer, when new ties and rail ought to be put into track; about three quarters man per mile, after the allotted number of ties have been placed, through the late summer and fall, and about one half man per mile through the greater part of the winter, excepting when a special extra force may be hired for cleaning snow and ice as occasion requires.

The section foreman, or one of his men detailed for the purpose, is required to examine the full length of his section every morning. He is also expected to patrol the section, both by day and night, during heavy storms or violent winds, and to especially watch all points where obstructions are liable. He also must keep informed of the time tables and the rules for the movements of trains; must keep well supplied with torpedoes, flags, lanterns, and all stop signals, and be possessed of intelligence to properly use the same.

The bridge supervisor reports to and receives instructions from the division superintendent. His work on the maintenance and repairs of bridges brings him into close relations with the engineering department, requiring frequent conference as to the best methods to be employed or plans to be adopted. He is required to make frequent inspections and keep informed in detail of the condition of all structures under his care. Large quantities of lumber and other material are used under his direction. It is his duty to inspect and check up material by the invoices, to report discrepancies or mark his approval on the bills if found correct as to quality and quantity. Reports showing distribution of expense for material and labor are required also in his case. He is also required to be familiar with and obedient to the rules governing trains, trainmen, and other classes of employes, so far as they relate to the proper discharge of his duties. He needs to be a thorough mechanic, ingenious, and quick to act in emergency; of sound judgment as to the strength of materials, industrious, and energetic.

Conductors, in common with locomotive engineers, on both passenger, freight, and work trains, are required to handle their trains according to the time tables and the orders issued by the superintendent. It is the duty of the conductors to make record of and to report to the superintendent the numbers and initials of cars as moved in their trains, whether loaded or empty; and at stations named in the time tables as registry stations to make entry in books provided showing the time of arrival and departure of trains, the numbers of locomotive and cars and the name of engineer and conductor. Conductors must also report car initials and numbers as moved in their trains, and state whether loaded or empty, in the same manner as agents.

Station agents report to and receive orders from the division superintendent, and also obey orders and instructions issued by the officers of other departments with which they have business relations. They also make report to the manager of the car service association. At a small station the agent acts also as telegraph operator, while the larger and important stations have a freight agent, a ticket agent, and operators also. Agents are responsible for the general condition of the buildings, yards, and company property at their station, and look out for the company's interests in their city or town. It is a part of their duty to see that side tracks, switches, signals, and lights at their station are kept in order; to see that cars are properly placed for loading and unloading; to see that loads placed in freight cars are such as to have them move generally in a homeward direction; to see that cars before loading are in proper order to receive freight; that loads on open cars are within proper limits, and that cars are not overloaded; and in cases where freight is found to be damaged or short of quantity as billed, to make a complete record of all conditions and circumstances. Proper way bills must always accompany all freight packages or cars. The agent is required to handle the United States mail according to fixed rules. Each agent sends daily reports, by telegraph if possible, to the car accountant, showing freight cars wanted, on hand and to spare. He also sends daily reports on proper blank forms showing car initials and numbers in detail of all arrivals and departures by train numbers and of cars remaining at his station. From the information so obtained, the car accountant is enabled to properly distribute cars of the proper kind to the stations where most urgently needed with the minimum length of haul, and also to direct the movement of freight cars in a homeward direction.

The car accountant is also thus enabled to keep an account of all cars and of the mileage of both home and foreign cars. Based on these records of mileage kept by the car accountant, settlements are made with foreign roads for the use of cars at the rate of one half cent per mile. For the settlement of demurrage charges, station agents are also required to send daily reports to the car association, stating in detail car numbers and initials, dates, and time of day they are placed for either loading or unloading. The demurrage rule is that for loading or unloading freight cars consignees or shippers are allowed ninety-six hours after the car is placed in an accessible position, and if the consignee or shipper requires more time, he is required to pay for the detention at the rate of one dollar per car per day.

The machinery department, as a part of the transportation department, is under the supervision of the superintendent of motive power, and subordinate to him are the general master mechanic in charge of locomotives and shops and the master car builder.

The general master mechanic supervises the division master mechanics and roundhouse foremen. The master car builder supervises the car shop foremen and car inspectors.

As a rule it may be stated that but few roads now build their own rolling stock, finding it more economical to purchase and have them built by contract with outside firms, and finding their shop facilities generally kept busy up to their capacity by their repair work. The extent and importance of repairs on rolling stock can be realized when I state that it is generally allowed by railroad men that about 10 per cent of the entire number of locomotives are in the shops for repairs constantly.

Shops for locomotive and car repairs of considerable extent are located at points most favorable. Minor and less important repairs on locomotives are made at the roundhouses; such as can be made without placing them out of service. Car inspectors' shops and outfits are maintained at terminals and junction stations with foreign roads.

Locomotives seldom leave the rails of the home road. At junction stations all cars arriving from foreign roads must pass under the eye of the car inspector. As to size of the car or its load, it must be within the advertised clearance limits; and it also must be in safe and secure condition in all its details, and not be overloaded beyond its rated capacity; otherwise the car inspector orders it to be sidetracked and the home road refuses to accept and handle it until its defects are remedied by the foreign road if it is a car defect, or by the shipper or consignee at times if improperly loaded in a way for which they are responsible. Car inspectors make repairs of injuries or broken parts when such can be made by the replacement of ready made standard parts, of which they keep a stock on hand. In case more extensive repairs are needed cars are sent to the extensive main repair shops.

Speaking in a general way, it may be said that shops for locomotive construction or repairs consist of the blacksmith shop, a foundry at times, the machine shop, and the erecting shop; and for car work the blacksmith shop, the wood working shop, the erecting shop, and the paint shop. Each of these shops has its foreman.

Division master mechanics and shop foremen need to employ considerable office or clerical forces. In these offices the payrolls and requisitions for material are made out, and thence to the superior officers for approval and through the usual channels hereinbefore mentioned.

Records and accounts of considerable interest are kept in this department, among which may be mentioned the method of guarantee and mileage account kept for the purchase of wheels, in order to make sure that the utmost care shall be taken at all times in their manufacture.

THE AMERICAN LOCOMOTIVE.

BY JOHN H. CONVERSE.

[John H. Converse, president of Baldwin Locomotive works; born Dec. 2, 1840, in Burlington, Vermont; he was educated at the University of Vermont; he is a member of Burnham, Williams & Co., who are the proprietors of the Baldwin Locomotive works of Philadelphia, and is prominently interested in a number of benevolent and religious enterprises; in 1900 he was made vice moderator of the Presbyterian General assembly and he is also trustee of the Princeton Theological seminary.]

It is generally conceded that the first locomotive built in America was constructed by Mr. Peter Cooper, of New York city. It was placed on the Baltimore & Ohio railroad in 1829, and was designed to demonstrate the practicability of using steam locomotives on the railroad track of that company, which then extended only thirteen miles, to Ellicott's Mills, Md. The question had been raised as to the practicability of a locomotive working around the short curves which existed at various points along the line, but the test of the engine settled this question.

The second locomotive built in America was undoubtedly "The Best Friend," built in 1830 by the West Point Foundry company, of New York city, for the South Carolina railroad. Two other locomotives were built in that and the following year by the same establishment. Colonel Stephen H. Long, of the United States Army, associated himself in 1830 with Mr. Norris, of Philadelphia, and in 1831 began the construction of a locomotive which was tried on July 4, 1832, on the Newcastle & Frenchtown railroad.

In the same year Mr. Matthias W. Baldwin, of Philadelphia, contracted to build for the Germantown railroad a small locomotive, which was finished in November, 1832, and was called the "Old Ironsides." This practically formed the foundation of the now famous Baldwin Locomotive works. At about the same time the firm of Davis & Gartner, of York, Pa., constructed their first locomotive, the "Atlantic." Mr. William T. James, of New York, also made one or two locomotives at about this period.

The business having thus been established, a considerable number of firms or corporations undertook the manufacture of locomotives. The works at present in business in the construction of ordinary railroad locomotives are the following:

Baldwin Locomotive works, Philadelphia, Pa.; Brooks Locomotive works, Dunkirk, N. Y.; Cooke Locomotive and Machine works, Paterson, N. J.; Dickson Locomotive works, Scranton, Pa.; Manchester Locomotive works, Manchester, N. H.; Pittsburgh Locomotive and Car works, Pittsburgh, Pa.; H. K. Porter Co., Pittsburgh, Pa.; International Power company, Providence, R. I.; Schenectady Locomotive works, Schenectady, N. Y.; Richmond Locomotive works, Richmond, Va.; Lima Locomotive and Machine works, Lima, Ohio.

The foreign trade in locomotives has been a growth of the last forty years. At first it was confined chiefly to Cuba and South America. Of late years, and chiefly within the past twenty-five years, it has extended to the eastern hemisphere, and the growth has been very great in that direction within the past ten years, so that now American locomotives have been sent to a greater or less extent to almost every country in the world where railroads are in operation. Within the past three years American locomotives have been supplied to railways in Great Britain and France and southern Germany. These countries have been large locomotive producers in the past, and have been competitors for foreign trade in South America, so that it is rather a remarkable development of industrial conditions in the United States that has made it possible to place American engines in those countries.

There have been three reasons for the introduction of American locomotives into Europe—first, the possibility of much earlier deliveries than European works could make; second, to some extent the preference for American locomotives as to their type, and size, and details; and third, the question of price. Owing to the design and character of American locomotives, they can be, and have been, constructed at a less cost per unit of weight than the ordinary European locomotives, although the wages in America are considerably higher than the wages in European locomotive works. This may be accounted for by both the characteristics of the American workman and by the probably more extended use of labor saving machinery of all kinds in American shops.

At the beginning of railroad operations in the United States the locomotive was a machine with a single pair of driving wheels, and the aggregate weight was probably not over from twelve to sixteen tons. The first change was the addition of the second pair of driving wheels and the coupling of them together, and the equalization, as we call it, of the driving wheels, which was an American device. Then the next change was in coupling six and eight driving wheels together, and the increase in the weight of locomotives from twenty to fifty tons. That change occurred from about 1840 to 1850. In the next two decades, from 1850 to 1870, nearly all the existing types of locomotives were brought out, and there was some increase in weight. About 1870 the standard American locomotives were about forty tons in weight for an ordinary freight locomotive and about thirty-five tons for the passenger locomotive. The development has been very great within the past decade, and now freight locomotives of one hundred tons and passenger locomotives from seventy to eighty tons are the rule. All these weights are for the locomotive proper and exclusive of the weight of the tender. The weight of the tender has proportionately increased, so that, while forty years ago a 2,000-gallon tender was considered to be a liberal size, we have now tenders of 7,500 gallons capacity.

The increase in speed has been one of the most remarkable developments of recent years. Some can remember when the technical papers gravely discussed the question whether the speed of a mile a minute had really ever been made on any American railroad, and there were those who maintained that such a story was only a myth. To-day there are trains running in the United States scheduled at a rate which means a speed of anywhere from seventy to eighty miles an hour. They actually run on that schedule, and they do it every day. Some of the fastest time in the world is made between Philadelphia and Atlantic City. The Pennsylvania railroad and the Reading railroad both have their lines from Philadelphia to Atlantic City, and they have summer trains which are scheduled to make the distance from Philadelphia to Atlantic City in sixty minutes. The distance is from fifty-five to fifty-nine miles, and out of the sixty minutes they have to take the ferry from Philadelphia to Camden, so that it is on record that passenger trains are run every day in the summer season from Camden to Atlantic City, a distance of fifty-five to fifty-nine miles, in from forty-five to fifty minutes.

There has been a close relation between the development of the locomotive and the introduction of steel rails of increasing weight, and also iron and steel bridges. All those elements of the problem have been found together.

The introduction of steel for rails in place of iron has made possible heavier locomotives, and also the gradual increase in the weight of steel rails until to-day rails weighing 100 pounds to the yard are being used, whereas, forty years ago a large part of the mileage of American railroads was laid with rails weighing less than sixty pounds to the yard, and generally of iron. Cars, too, have been increased in weight and capacity. Thirty or forty years ago a car weighing ten tons was loaded with ten tons of freight, and a heavier load than that was discouraged; in fact, double rates were charged on loading in excess of a certain amount, which was twelve tons, while to-day cars are built to carry 100,000 pounds, or fifty net tons.

The effect of this increase in the size and speed of the locomotive and of the substitution of steel for iron, the increase in the weight of rails and in the improvement of bridges has been very largely to reduce the cost of operating the roads, and to that fact is due the decrease in the cost of transportation.

American builders have probably more than doubled the weight of locomotives in twenty-five or thirty years, and at the same time have made most important improvements in the quality of material, but have done it with an increase in the price of not more than 40 or 50 per cent. The changes in the material have been the adoption of steel for boilers instead of iron; of thicker boilers and stronger boilers, made in a much more expensive and elaborate way, so as to be capable of carrying a steam pressure of 200 pounds to the square inch, whereas thirty or forty years ago 100 pounds was the ordinary pressure. More parts are made of steel about the locomotive than formerly; tender frames are made of steel; the tanks are made of steel; the cabs are made of steel, where they were formerly of wood. All the wheels under a locomotive and tender are steel tired, where formerly both the tender and engine truck wheels were cast iron. This substitution has been made possible by great improvements in the production of steel.

These changes are common to all locomotive works in America, but in Europe practice has been more firmly established, and they have adhered to their original standards to a greater extent. The American railroad system was built up largely on borrowed money, and had to be developed under conditions of the greatest economy; light rails, wooden bridges, cheap structures had to be used in order to make it possible to stretch the railroads across the vast western territories; but with the growth of the country and the strengthening of these great railroad lines the roads have been rebuilt, and heavier rails and better bridges and better equipment have been substituted. The locomotive and car manufacturers simply reflect the development of the country, and of its interests, and have adapted themselves to that development.

In extending the foreign market for locomotives some very high tariffs are encountered. In Russia, for example, the duty on a locomotive is four cents a pound, and is fully effective in its purpose to protect Russian manufacturers. In dealing with the Russian government, however, the Baldwin works, which in four or five years have supplied about 150 locomotives for the trans-Siberian railroad, did not encounter the tariff, as their contracts provided for delivery on board steamer at a Russian port. In the majority of foreign countries the railway system is largely governmental, and the tariff question is thus eliminated from the transaction.

As regards importing foreign locomotives into the United States, it is interesting to note that there is only a single case on record in the last quarter of a century, and that was a specimen locomotive ordered in England by the Pennsylvania railroad company for the purpose of serving as a pattern of a new type and of workmanship. Locomotives have been growing more and more alike in American and foreign practice.

The principal distinction between American and foreign locomotives to-day is the use in America of the bar frame as contrasted with the plate frame, which latter is a feature of European practice. American locomotives, further, are invariably built with outside cylinders, while in Great Britain and on the European continent inside cylinders and crank axles are still used to some extent. These two details to-day represent the most radical differences between the American engine and that of other countries.

DEVELOPMENT OF STEEL RAILROAD CARS.

BY GEORGE A. HUTCHINS.

[George A. Hutchins is the expert of the United States government who had charge of an investigation into the history and manufacture of steel railway cars; he also has conducted other statistical work for the government notably in the twelfth census of the United States.]

The American railroad car is the outcome of a remarkable yet gradual development. Invention has followed invention, discovery has succeeded discovery, until, from the old fashioned stage coach placed on an unstable frame, with four flanged wheels, and heated with a warming pan, has been developed the luxury of the private car of to-day.

The first passenger car was constructed in 1814. It consisted simply of the body of a stage coach mounted on a wooden frame with flanged wheels. It was natural that the stage coach should be selected as a model, for in it the conveniences of travel had been most highly developed, and it was also a matter of economy, for the stage owners became railroad promoters and transformed their displaced vehicles into railway coaches. In 1825 the Stockton and Darlington railway of England was opened, and trains of coal cars with one passenger coach were run regularly. The coach was well patronized for a time, but when the novelty wore off the faster stage coaches carried the passengers.

In America the changes in car construction have been marked. The first important modifications were made necessary by the speed developed in the locomotive. With increased speed, the light, cast-iron wheels first demanded attention. The shape of the tread and flange was developed by Knight. Edgar and Winans developed the "chilled" features, and Davis altered the disposition of the metal and introduced into the cast-iron wheel a wrought-iron ring, thus perfecting the chill and strengthening the wheel. The light, unsteady cars easily adapted themselves to the unevenness of the road, but the new conditions of speed demanded a stronger rail, a more stable car frame, a flexible truck, and improvement in brakes. Indeed, the development of the locomotive has necessitated a scientific development of the entire railway system.

Adaptation to circumstances has changed the rail from the rude wooden stringer with a piece of strap iron spiked along the top, to the present refined section of steel, whose every dimension, angle, and curve are exactly suited to the tremendous strain it has to bear.

In 1833, Ross Winans, of Baltimore, built three long cars, each capable of seating sixty passengers. With these originated the American passenger car of the present day, and to Winans is due the adoption of cars with longer and more stable frames, having bogie or swiveling four wheeled trucks at each end. These cars were a marked improvement upon the old coach, yet they have been aptly called "combinations of inconveniences." Until late in the fifties the springs were made of india rubber. These were unsatisfactory because of their tendency to harden with age, and gradually they were replaced by steel springs. The cars had no raised roof. The windows were glazed in solid without any sash, because of the fear that accidents would surely follow should they be opened. The methods of ventilation supplied an abundance of dust and cinders. The lighting was poor. The heat was supplied by cast iron stoves which broiled those who sat near them, when they failed to warm those who did not.

Many of the dangers of the old platform, buffer, and coupler were eliminated by the patents of Colonel Miller, in 1867, but it was not until after the dining car was introduced that the importance of a safe, covered passageway came to be fully recognized. This need was met by Mr. Pullman in his "vestibuled train," which not only provides for the convenience and safety of the passengers while going from one car to another, but at the same time furnishes a buffer extending from one platform to roof, thus producing one of the best anti-telescoping features and greatly lessening the danger to human life in case of collision.

The brake, with its wonderful development from the old hand brake to the air brake patented by Westinghouse; and the modern coupler, which is the result of countless experiments and over 6,500 patented inventions, have eliminated many of the dangers of the old methods and devices. Each year shows a marked improvement in features contributing to the comfort and safety of the passenger, and in providing cheap, speedy, regular, and adequate transportation in cars especially adapted to the needs of the public.

In the construction of freight cars, the change has been equally marked. Many devices for the protection of life and property have been readily adopted. There is a general tendency toward specialization. No longer are grain, beef, fruits, and oil shipped in the same kind of cars. The transportation of various kinds of products has called into being cars peculiarly adapted to each class of freight, so that scores of different kinds of cars are now constructed to meet the demands of shippers. Perishable articles are now conveyed in cars which insure their preservation.

The tendency of the changes in the modern freight car is toward increased weight, strength, size, and convenience. In developing these qualities steel has been used in some cases to replace wood, and, in other cases, steel plates have been used to strengthen wooden construction. The growth of the steel car industry has been phenomenal. The Pressed Steel Car company of Pittsburg, Pa., uses in the manufacture of its product over 1,600 tons of steel a day, and is the largest single consumer of steel in the world. The changes have resulted in an increased carrying capacity of the cars, a decrease in the relative dead weight moved, and a better paying load. Marked advances in the average capacity per car have been made in the last few years. The normal capacity in the sixties was about 15,000 pounds. The capacity increased to 28,000 in 1873; to 40,000 in 1875; to 60,000 in 1885; to 70,000 in 1895; while at the present time cars with a capacity of 80,000 to 100,000 pounds are in everyday use. The economy of heavy loading has been indisputably proved. According to figures of the industrial commission, the average train load for the United States, as a whole, increased from about 175 tons of paying freight in 1890 to 243.5 tons in 1899.

The movement toward combination began among the railroads earlier than in industrial lines, and made possible "through trains" by which goods could be shipped long distances rapidly and at low rates.

The changes that have taken place in business methods have been largely due to improved methods of transportation. The traffic of railroads has become the greatest single business ever carried on in the annals of the world, all other business contributing to swell its volume. It has become one of the greatest factors in changing the conditions of supply and demand and revolutionizing the habits and aspirations of mankind.

A study of economic history and industrial progress leads to the conclusion that in no other country has the development of the car industry been more rapid than in the United States. Transportation of persons and property with ease, speed, and safety has ever been the aim of railroad promoters and the demand of the American people, and as a result, the railway system of the United States to-day is the most progressive and among the most perfect in the world.

AMERICAN SUPREMACY IN BRIDGE BUILDING.

BY THOMAS CURTIS CLARKE.

[Thomas Curtis Clarke, civil engineer; born Newton, Mass., 1827; graduated from Harvard college, 1848; specialist in bridge engineering, having built about 125 miles of iron and steel bridges, viaducts and elevated railways; was president of the American Society of Civil Engineers. The following article is republished from the Engineering Magazine by arrangement with the publishers.]

Copyright 1901 by John R. Dulnap

As one of the pioneers of American bridge construction, I have been asked to give the reasons why American bridge companies can offer such advantages to purchasers of steel bridges in foreign countries that they obtain orders, in spite of that prejudice which naturally favors one's own countrymen. The brief answer is that Americans are twenty years in advance of other nations (except Canada) in the art of bridge design and construction, as a short explanation will serve to show.

The steel of which a bridge is made represents about half of its cost. Steel is now made in the United States at much less cost than in any other country. In Britain, labor is so much hampered by trades unionism that it is admitted by one of their leaders that the cost of labor in making steel in the United States is not one half of what it is in Britain. This can be said also of the labor employed in manufacturing. Maxim tells us that after he had perfected a machine tool for making a certain part of his gun, a union leader fixed the output at one and one half pieces daily. The mechanic did not dare to make any more. Maxim imported a machinist from Germany who turned out from six to eight pieces daily.

The market for bridges is far greater in the United States than elsewhere. The states have now more than 200,000 miles of railways, and it has been estimated that there is an average of one span of metallic bridge for every three miles of railway. This gives 66,000 bridges on existing lines, without including those required for new lines. The increase in the United States of the weight of cars and engines has resulted in wonderful economic changes. The average rate of freights on American railways was in 1867 a little over five dollars per ton. Now it averages ninety-five cents. Any one can figure the saving on 1,306,000,000 tons of freight moved in 1903. These larger cars carry double the paying load of the old ones that they have superseded, and more powerful engines draw more cars in a train. This increase of weight of rolling stock has led to the renewal of the 66,000 old bridges by stronger and heavier ones. This demand has brought into existence many bridge building companies, and they can well afford to equip themselves with the best labor saving and accurate working machinery, regardless of first cost, as they know it would seldom if ever lie idle. European bridge builders are not in this position. Trains have not increased in weight as they have in America. The old bridges answer their purpose, and the demand has been chiefly confined to new ones. Bridge building is merely an adjunct to other business, and possibly the owners are wise in not investing much capital in special tools.

One of the most accomplished of American bridge constructors, Mr. J. V. W. Reynders, superintendent of the Pennsylvania Steel company at Steelton, Pa., has kindly allowed the writer to quote from a letter on this subject:

"Some of my impressions in regard to the causes which have resulted in the supremacy of American bridge builders, which impressions are partly the result of my visit to French, German, and English shops during the summer of 1900, are as follows:

"As to general causes, our almost unlimited home field has entailed in the past a strenuous domestic competition beyond European conception. As a result, when the long overdue trial of strength came, we were as much surprised no doubt as our competitors at our superior facilities to manufacture promptly and cheaply.

"The development of the industry was much aided owing to the fortunate relations existing between American consulting engineers representing the purchaser and the works. Our excellent specifications were developed largely by the former, while the works management, frequently composed of young and enterprising men, kept the manufacturing facilities well abreast of the increasing demands of the specifications. A broad minded publicity insured a practically uniform growth, not only in the development of the specifications, general designs, and details of construction, but also in the mode of manufacture and economic erection.

"The disinclination of European managers to invest in new appliances has become an old story, but nothing short of a personal visit to the works can disclose the amazing methods still in vogue in France, England, and, in a much lesser degree, in Germany; the manufacture and erection of bridges resolves itself largely into a 'handling proposition.' Much as could be said of the convenient and substantial character of our machine tools, the first problem that presses for solution is that of handling pieces, weighing many tons, from one tool to another. And this problem properly solved insures not only an immense reduction in the shop labor, but brings with it an increased output, as against which the general and office expense remain nearly stationary. The electric traveling crane is, without doubt, the most potent individual factor in the success of American shops, next to which I would mention the application of electric motors for driving single or grouped machines, doing away with shafting or belts, which interfere with the operation of traveling cranes, and at the same time enabling tools to be placed in such positions that long pieces can generally be kept parallel with the direction of the general shop travel.

"In the French shops visited by the writer, handling was done entirely by main strength and awkwardness, not a single traveling crane being in evidence. Nor did a single tool impress itself on his mind that would not be consigned to the scrap pile with us. English shops are somewhat in advance of this state, and while in Germany the nearest approach to American practice is found, the scale of expenditure for equipment is much reduced. As a rule, German managers fully appreciate the state of American art of manufacture. They are restricted generally, owing to the disinclination of works owners to invest lavishly in plant, and, in point of fact, it may be doubted whether the general volume of business in Germany would enable any one modernized plant to secure enough business to keep things hustling the year round. The aggregate annual output of the four largest bridge works in Germany is approximately 32,000 tons, which is equivalent to the tonnage of a single American shop of the first class. In conclusion, I would call attention to one other element of our success—that is, the ability of American railroads to handle long and heavy pieces. As a result, American designers enjoy great latitude as to dimensions of single members making up a bridge, and this in turn has its effect on the design of bridge shops which are suited to handle pieces weighing in some instances as high as eighty-five tons, and other pieces such as plate girders having a length of one hundred and twenty feet or more."

This condition of European bridge shops recalls to me the condition of those American shops which were in existence in 1870. The American bridge engineer of to-day has few of the difficulties that were overcome by the early designers of iron bridges. The mathematics of simple forms of bridges was understood in 1870, but the proportioning of details had to be worked out by each man for himself. Every new span was a new problem. Now, the proportions of lengths of span to height, and the length of panels, have been fixed by practice. Connections have become so far standardized that the duplication of parts can be carried to its fullest extent. The proper spacing of rivets is now better understood. Designs are so made that machine tools can make every part. Great accuracy is attained and the sizes of parts have increased. The bridge is never assembled until it reaches the staging or false works, and it comes together like the parts of a clock. Much of it is fastened together by power rivetters. Except in a few instances, the American bridge builders know that the designs of the engineer of the purchaser will be similar to those that he has been in the habit of working under, and no abnormal features will be embodied. Everybody now knows what every one else is doing.

The foreign engineer, with some notable exceptions, is somewhat isolated in his own office, and solves each problem by requiring strength and durability only, and without much attention to the use of such details as insure economy of construction and rapidity of erection.

It is a frequent complaint in the English press that the sections of metal called for by their engineers are unusual and not kept in stock. They complain that the details are often so complicated that duplication is impossible, and that sometimes hand labor only can be had. They complain that the economy of time in erection is not duly considered. A late notable example is of a bridge in Australia, where all the raw material was hauled seventy miles to the site, where shops were built for this bridge only. One can imagine the cost of such a bridge. In another case the engineer required that the bridge should be all rivetted together complete in the maker's yard in England, then cut apart and shipped, and rivetted a second time on the scaffold.

The result of these different methods of operation is seen in the following statement of three important contracts captured by American bridge builders from the native competitors. It should be observed that these contracts would not have been so awarded unless the engineers of the purchasers had first sat-

DESCRIPTION OF STRUCTURES.	WEIGHTS. GROSS TONS.	NAMES OF ENGINEERS.	NAMES OF CONSTRUCTORS.	AMERICAN.		ENGLISH.	
				COST PER TON.	TIME.	COST PER TON.	TIME.
Atbara Bridge, Africa, 7 spans of 147 feet.	622	Sir Douglas Fox.	Pencoyd Iron Works.	$51.95	Construction 6 weeks, erection, 8 weeks: 14 weeks.	$76.64	First span in 2 months; remainder, one span every 3 weeks.
Gokteik Viaduct, Burmah, 2,260 ft. long by 320 ft. high.	4,332	Sir Arthur Rendel.	Penna. Steel Co.	$73.00	1 year.	$128.95	3 years.
Uganda Viaducts, East Africa.	7,000	Sir Arthur Rendel.	American Bridge Co.	$45.01 $87.59	Delivered 10 months. Erected 46 weeks.	$74.21 $105.23	Delivered 60 weeks. Erected 130 weeks.

isfied themselves that both the steel material and the workmanship of the Americans were quite as good as, if not better than, those proposed by home constructors.

It goes without saying that proper specifications and careful and rigid inspection must insure this result. The engineer's plans were made to allow of the use of sections in stock, the details were of the American type; and rapid erection was assisted and not hindered. Everything was of the most complete modern type.

Great credit is due to those eminent engineers—Messrs. Fox and Rendel—for their liberal and advanced views, without which a fair competition could not have been secured.

The interesting question for English, French, Belgian, German, Austrian and Italian bridge constructors is—how to get back this business from their American competitors? A few large works may learn to make steel at as low cost as Americans do. To do that they must have the courage of Carnegie, who throws into the scrap heap a million of dollars of machinery that has become a little antiquated. They can observe methods of design and imitate them, as some progressive American manufactures have done. But how shall they get the constant market for bridges which has enabled American bridge companies to invest vast sums in labor saving machinery and other appliances?

It seems to me that there is but one way, and that is to stop spending so much money yearly on armament, and apply it to the reconstruction of their railways.

AMERICAN BRIDGE CONSTRUCTION.

BY HENRY S. JACOBY.

[Henry Sylvester Jacoby, engineer and professor of bridge engineering in Cornell university; he was born April 8, 1857, at Springtown, Pa., and after studying at the district schools and the Excelsior normal institute at Cartersville, Pa., he continued his education at Lehigh university, whence he was graduated in 1877; 1879–85 he was chief draftsman in the United States engineers' office at Memphis, Tenn., and for the four following years, until 1890, was instructor in civil engineering at Lehigh; in 1890 he became professor of bridge engineering at Cornell; he is the author of Notes and Problems in Descriptive Geometry, Outlines of Descriptive Geometry, Textbook on Plain Lettering, Textbook on Roofs and Bridges, and numerous contributions to technical journals.]

The application of scientific principles to the construction of bridges is more complete to-day than ever before. This statement applies to the specified requirements which the finished structure must fulfill, the design of every detail to carry the stresses due to the various loads imposed, the manufacture of the material composing the bridge, the construction of every member in it, and finally the erection of the bridge in the place where it is to do its duty as an instrument of transportation.

A close study of the economic problems of transportation in the United States and the experimental application of its results led the railroad managers to the definite conviction that, in order to increase the net earnings while the freight rates were slowly but steadily moving downward, it was necessary to change the method of loading by using larger cars drawn by heavier locomotives, so as to reduce the cost of transportation per train mile. While these studies had been in progress a number of years and there was a gradual increase in the weight of locomotives, it is only within the past five years that the test was made, under favorable conditions and on an adequate scale, to demonstrate the value of a decided advance in the capacity of freight cars and in the weight of locomotives for the transportation of through freight. The test was made on the Pittsburg, Bessemer & Lake Erie railroad, which was built and equipped for the transportation of iron ore from Lake Erie to Pittsburg and of coal in the opposite direction.

When this economic proposition was fairly established, it was wonderful to see how railroad managers and capitalists met the situation, by investing additional capital for the newer type of equipment, and for the changes in the roadbed and location necessarily involved with that in the rolling stock. Curves were taken out or diminished, grades were reduced, heavier rails were laid, and new bridges built, so that practically some lines were almost rebuilt. The process is still going on and money by the hundred millions is involved in the transformation and equipment of the railroads. Some impression of the magnitude of change in equipment may be gained from the single fact, that one of the leading railroads has within a few years expended more than $20,000,000 for new freight cars alone, all of which have a capacity of 100,000 pounds.

The form of loading for bridges almost universally specified by the railroads of this country consists of two consolidation locomotives followed by a uniform train load. These loads are frequently chosen somewhat larger than those that are likely to be actually used for some years in advance, but sometimes the heaviest type of locomotives in use is adopted as the standard loading. The extent to which the specified loadings have changed in eight years may be seen from the following statement based on statistics compiled by Ward Baldwin and published in the Railroad Gazette for May 2, 1902.

Of the railroads whose lengths exceed one hundred miles, located in the United States, Canada and Mexico, only two out of seventy-seven specified uniform train loads exceeding 4,000 pounds per linear foot of track in 1893, while in 1901, only 13 out of 133 railroads specified similar loads less than 4,000 pounds. In 1893, 37 railroads specified loads of 3,000 pounds and 29 of 4,000 pounds, while in 1901, 4,000 pounds was specified by 50, 4,500 by 14 and 5,000 by 17 railroads. The maximum uniform load rose from 4,200 pounds in 1893 to 6,600 pounds in 1901.

In a similar manner in 1893 only one railroad in seventy-five specified a load on each driving wheel axle exceeding 40,000 pounds, while in 1901 only thirteen railroads out of ninety-two specified less than this load. In 1893 only twenty-one out of the seventy-seven railroads specified similar loads exceeding 30,000 pounds. The maximum load on each driving wheel axle rose from 44,000 pounds in 1893 to 60,000 pounds in 1901.

The unusual amount of new bridge construction required caused a general revision of the standard specifications for bridges, the effect of which was to include the results of recent studies and experiment, and to eliminate some of the minor and unessential items formerly prescribed.

Meanwhile another movement was in progress. Experience having shown the great advantage of more uniformity in various details and standards relating to the manufacture of bridges both in reducing the cost and the time required for the shop work, an effort was begun to secure more uniformity in the requirements for the production and tests of steel, which is the metal now exclusively employed in bridges.

The American section of the International Association of Testing Materials is bringing together through its investigations and discussions a mass of selected information on the relation of chemical composition, heat treatment, mechanical work, etc., to the physical properties of steel as well as of other metals used in structures and for mechanical purposes.

The thorough digest of these results of scientific research and practical tests, and the preparation and adoption of standard specifications for different classes of material, are confidently expected to eliminate many old requirements which are proven inefficient in securing results for which they were originally intended, and to incorporate in the specifications only the essential requirements by which the character of the product may be determined with sufficient precision for its actual duty. By making these requirements reasonable and fair, on the one hand as simple and definite as possible without impairing their real value and on the other hand flexible enough to avoid imposing undue hardship upon the manufacturer who keeps in touch with the best materials available, the result is confidently expected to be a high degree of co-operation on the part of engineer and manufacturer in securing the best grade of material which the present state of science makes practicable.

The American section of that association in 1901 adopted a series of proposed standard specifications, one of which relates to steel for bridges and buildings and which is recommended for adoption by those who buy such structures.

With greater uniformity in the physical, chemical and other requirements for steel, as determined by standard tests, the unit stresses to be prescribed for the design of bridges will naturally approach a corresponding uniformity. To what extent this is desirable may be inferred from the fact that the application of several of the leading specifications to the design of a railroad bridge under a given live load yields results which may vary by an amount ranging from zero to twenty-five per cent of the total weight.

In the revision of specifications a decided tendency is observed to simplify the design by making an allowance for impact, vibration, etc., by adding certain percentages to the live load according to some well defined system. It needs but relatively little experience in making comparative designs of bridges under the same loading, to show the advantage of this method over that in which the allowance is made in the unit stresses according to any of the systems usually adopted in such a case. Not only are the necessary computations greatly simplified but the same degree of security is obtained in every detail of the connections as in the principal members which compose the structure.

Experiments on a large scale are very much needed to determine the proper percentage of the live load to be allowed for the effect of impact, so as to secure the necessary strength with the least sacrifice of true economy. While the extreme economy of material that was formerly practiced is not now desirable, since stiffness receives due consideration, some idea of the importance of such an investigation may be gained by considering the magnitude of the industries involved.

A movement which has done much good during the past decade and promises more for the future is that of the organization of bridge departments by the railroad companies. The great economy of making one design rather than to ask a number of bridge companies to make an equal number of designs, of which all but one are wasted, is the first advantage; but another of even greater significance in the development of bridge construction is that which arises from the designs being by those who observe the bridges in the conditions of service and who will naturally devote closer study to every detail than is possible under the former conditions. The large number of responsible designers also leads to the introduction of more new details to be submitted to the test of service, which will indicate those worthy of adoption in later designs. In order to save time and labor and to secure greater uniformity in the design of the smaller bridges, some of the railroads prepare standard plans for spans varying by small distances. For the most important structures consulting bridge engineers are more frequently employed than formerly when so much dependence was placed on competitive designs made by the bridge companies.

An investigation was recently made by a committee of the Railway Engineering and Maintenance of Way association in regard to the present practice respecting the degree of completeness of the plans and specifications furnished by the railroads. It was found that of the seventy-two railroads replying definitely to the inquiry, 33 per cent "prepare plans of more or less detail, but sufficiently full and precise to allow the bidder to figure the weight correctly and if awarded the contract to at once list the mill orders for material"; 18 per cent "prepare general outline drawings showing the composition of members, but no details of joints and connections"; while 49 per cent "prepare full specifications with survey plan only, leaving the bidder to submit a design with his bid." If, however, the comparison be made on the basis of mileage represented by these seventy-two railroads, the corresponding percentages are 48, 24 and 28 respectively. The total mileage represented was 117,245 miles. A large majority of the engineers and bridge companies that responded were in favor of making detail plans.

The shop drawings which show the form of the bridge, the character and relation of all its parts, give the section and length of every member, the size and position of every detail, whether it be a reinforcing plate, a pin, a bolt, a rivet, or a lacing bar. All dimensions on the drawing are checked independently so as to avoid any chance for errors. The systematic manner in which the drawings are made and checked and the thorough organization of every department of the shops, makes it possible to manufacture the largest bridge, to ship the pieces to a distant site and find on erecting the structure in place that all parts fit together, although they had not been assembled at the works.

The constant improvement in the equipment of the bridge shops, and the increasing experience of the manufacturers who devote their entire time and attention to the study of better methods for transforming plates, bars, shapes, rivets, and pins into bridges constitute important factors in the development of bridge construction.

As the length of span for the different classes of bridges gives a general indication of the progress in the science and art of bridge building, the following references are made to the longest existing span for each class, together with the increase in spans which has been effected approximately during the past decade.

In plate girder bridges the girders, as their name implies, have solid webs composed of steel plates. A dozen years ago but few plate girders were built whose span exceeded 100 feet, the maximum span being but a few feet longer than this. To-day such large girders are very frequently constructed, and the maximum span has been increased to 126 feet between centers of bearings. This is the span of the large plate girders on the viaduct of the riverside drive in New York city, erected in 1900. The longest railroad plate girder was erected about the same time on the Bradford division of the Erie railroad, its span being 125 feet 2½ inches. The heaviest plate girder is the middle one of a four track bridge on the New York Central railroad erected last year near Lyons, N. Y. Its weight is 103 tons and its depth out to out 12 feet 3 inches.

The large amount of new construction and the corresponding increase in the weight of the rolling stock have combined to secure a more extensive adoption of plate girders and the designs of many new details for them. These affect chiefly the composition of the flanges, the web splices, the expansion bearings and the solid floor system. Although solid metal floors built up of special shapes were first introduced into this country fifteen years ago, their general adoption has taken place largely within the last decade on account of their special adaptation to the requirements of the elevation of tracks in cities. Solid floors not only may be made much shallower than the ordinary open type, thereby reducing the total cost of the track elevation, but they also permit the ordinary track construction with cross ties in ballast to be extended across the bridge, thus avoiding the jar which otherwise results as the train enters and leaves the bridge, unless the track is maintained with extraordinary care.

The necessity for bridges of greater stiffness under the increased live loads has also led to the use of riveted bridges for considerably longer spans than were in use six or seven years ago. The use of pin connected trusses for spans less than about 150 feet is undesirable for railroad bridges, on account of the excessive vibration due to the large ratio of the moving load to the dead load, or weight of the bridge itself.

While riveted bridges are now quite generally used for spans from 100 to 150 feet, they have been employed to some extent up to 181½ feet. The recent forms of riveted trusses do not, however, conform to the general character of European designs, but embody the distinctively American feature of concentrating the material into fewer members of substantial construction. With but rare exceptions the trusses are of the Warren, Pratt, and Baltimore types with single systems of webbing. At a distance where the riveted connections cannot be distinguished the larger trusses have the same general appearance as the corresponding pin bridges.

The recent examples of viaduct construction with their stiff bracing of built up members and riveted connections exhibit a marked contrast to the older and lighter structures, with their adjustable bracing composed of slender rods. The viaduct which carries the Chicago & Northwestern railroad across the valley of the Des Moines river, at a height of 185 feet above the surface of the river is 2,658 feet long. It was built in 1901, is the longest double track viaduct in the world, provided those located in cities be excluded, and is an admirable type of the best modern construction. The tower spans are 45 feet long and the other spans are 75 feet long. Four lines of plate girders support the two tracks. Along with this viaduct should be mentioned the viaduct terminal of the Chesapeake & Ohio railway at Richmond, Va., whose length including the depot branch is 2.13 miles. A large part of this is not very much higher than an elevated railroad in cities. The excellent details and clean lines of this substantial structure give it a character which is surpassed neither in this country or abroad. It may be added that the highest viaduct in this country, and which was rebuilt in 1900, is located 17 miles from Bradford, Pa., where the Erie railroad crosses the Kinzua creek at a height of 301 feet. It has a length of 2,053 feet.

While the elevated railroads which have been built recently also embody many of the characteristics of the best viaduct construction, special study has been given to improve their æsthetic effect. The use of curved brackets, of connecting plates whose edges are trimmed into curves so as to reduce the number of sharp angles, and of rounded corners of posts, constitute some of the means employed. The results are seen in the structures of the Boston elevated railroad and in some of the latest construction in Chicago.

The longest span of any simple truss in America is that of the bridge over the Ohio river at Louisville, erected in 1893. Its span center to center of end pins is 546½ feet. Since that time several other bridges have been built which are considerably heavier, although their spans are somewhat shorter. The most noteworthy of these are the Delaware river on the Pennsylvania railroad near Philadelphia and the Monongahela river bridge of the Union railroad at Rankin, Pa., both of which are double track bridges. The Delaware river bridge was erected in 1896, each one of its fixed spans having a length of 533 feet and containing 2,094 tons of steel. The Rankin bridge was erected in 1900. Its longer span has a length of 495 feet 8½ inches between centers of end pins and contains 2,800 tons of steel, making it the heaviest single span ever erected. It may also be added that the locomotive and trainload for which this bridge was designed is the heaviest that has yet been specified.

The recent changes in the details of pin constructed truss bridges have been mainly the result of efforts to eliminate ambiguity in the stresses of the trusses, to reduce the effect of secondary stresses, and to secure increased stiffness as well as strength in the structure. Double systems of webbing have been practically abandoned so far as new construction is concerned. The simplicity of truss action thus secured permits the stresses to be computed with greater accuracy and thereby tends to economy. Before the last decade very few through bridges, and those only of large span, were designed with end floor beams in order to make the superstructure as complete as possible in itself and independent of the masonry supports. Now this improved feature is being extended to bridges of small spans. Similarly dropping the ends of all floor beams in through bridges so as to clear the lower chord and to enable the lower lateral system to be connected without producing an excessive bending moment in the posts has likewise been extended to the smaller spans of pin bridges and is now the standard practice. The expansion bearings have been made more effective by using larger rollers, and of bedplates so designed as to properly distribute the large loads upon the masonry. In the large spans of through bridges the top chord is curved more uniformly, thereby improving the æsthetic appearance. These chords are also given full pin bearings, thus reducing the masonry stresses.

The stiffness of truss bridges has been secured by adopting stiff bracing in the lateral systems and sway bracing, instead of the light adjustable rods formerly used. At the same time adjustable counter ties in the trusses are being replaced in recent years by stiff ones, while in some cases the counters are omitted and the main diagonals designed to take both tension and compression.

Some of the same influences referred to above have led to much simpler designs for the portal bracing by using a few members of adequate strength and stiffness similar in general character to those of the trusses.

Such steady progress in the design and construction of railroad bridges of moderate span has, unfortunately, no adequate counterpart in highway bridges. The conditions under which highway bridges are purchased by the township and county commissioners are decidedly unfavorable to material improvement in the character of their details. It is a comparatively rare occurrence that the commissioners employ a bridge engineer to look after the interests of the taxpayers by providing suitable specifications, making the design, inspecting the material, and examining the construction of the bridge to see that it conforms to the imposed requirements. Those provisions are only made in some of the cities, and accordingly one must examine the new bridges in cities to learn what progress is making in highway bridge building.

The lack of proper supervision in the rural districts and many of the smaller cities results in the continued use of short trusses with slender members built up of thin plates and shapes, whose comparatively light weight causes excessive vibration and consequent wear, as well as deterioration from rust. Under better administration plate girders would be substituted for such light trusses, making both a stiffer structure and one more easily protected by paint. The general lack of inspection and the consequent failure to protect highway bridges by regular repainting will materially shorten their life and thereby increase the financial burden to replace them by new structures. Some progress has been made in adopting riveted trusses for the shorter spans for which pin connected trusses were formerly used, but the extent of this change is by no means as extensive as it should be, nor equal to the corresponding advance in railroad bridges.

The channel span of the cantilever bridge over the Mississippi river at Memphis, Tenn., is the longest one of any bridge of this class in America. It measures 790½ feet between centers of supports. This bridge was finished in 1892, or only two years after the close of the seven year period of construction and erection of the mammoth cantilever bridge over the Firth of Forth in Scotland. A number of cantilever bridges have been built since then, but most of them have comparatively short spans. There is one now over the Monongahela river at Pittsburg, whose span is a little longer than that of the Memphis bridge. It is on the new extension of the Wabash railroad system, and the distance between pier centers is 812 feet. But there is another one which not only has a longer span than any other cantilever bridge in this country but longer than any other bridge whatsoever. It is located near Quebec, Canada, and its channel span over the St. Lawrence river is of the unprecedented length of 1,800 feet, or nearly 100 feet longer than that of the Forth cantilever bridge and 200 feet longer than the Brooklyn suspension bridge. The towers have a height of 360 feet above high tide. It accommodates a double track railroad, besides two electric railway tracks and highways. In the piers the courses of masonry are four feet high and the individual stones weigh about fifteen tons each.

The Brooklyn bridge, completed in 1883, is still the largest suspension bridge in the world, its span being 1,595½ feet. More people cross this bridge than any other in the country. The new East river bridge has a span of 1,600 feet, and its capacity will be very much greater than that of the Brooklyn bridge. Each of its four cables has a safe strength of over 10,000,000 pounds in tension.

One of the most interesting developments relating to the subject under consideration is the construction of a considerable number of metallic arch bridges in recent years and the promise of their still greater use in the future. On account of their form they constitute one of the handsomest classes of bridges.

The first important steel bridge in the world was completed in 1874. It is the arch bridge which in three spans crosses the Mississippi river at St. Louis. Its arches are without hinges and their ends are firmly fixed to the piers.

This is one of the most famous bridges in existence. For a long time after its construction no metallic arches were erected in this country, although many were built in Europe. In 1888, however, the highway bridge across the Mississippi river at Minneapolis was erected, consisting of two spans of 456 feet each and which still remains the longest span of any three hinged arch. The following year the Washington bridge over the Harlem river in New York city was completed. It consists of two spans of 510 feet in the clear and has the longest two hinged arch ribs with solid web plates.

These were followed by a number of arches of various types, the most noted of which are the two arch bridges over the Niagara river. The first one is a spandrel braced, two hinged arch with a span of 550 feet and replaced the Roebling suspension bridge in 1897. It accommodates the two tracks of the Grand Trunk railroad on the upper deck and a highway on the lower deck. The other bridge has arched trusses with parallel chords and two hinges. It replaced the Niagara and Clifton highway suspension bridge in 1898, and as its span is 480 feet, it is the longest arch of any type in the world. The manner in which this arch was erected furnishes an illustration of the effort which is made by engineers to conform the actual conditions as far as possible to the theoretic ones involved in the computation of stresses. Since the stresses in an arch having less than three hinges are statically indeterminate, stresses of considerable magnitude may be introduced into the trusses if the workmanship be imperfect, the supports not located with sufficient precision and the arch closed without the proper means and care.

The Niagara and Clifton arch was first closed as a three hinged arch and then transformed into a two hinged arch by inserting the final member under the sum of the computed stress due to the weight of the truss, and that due to the difference between the temperature at which the closure was made and that assumed as a standard in the stress computations. This stress was secured in the member by inserting it when the hydraulic jack which forced apart the adjacent ends of the shortened chords registered the required amount of pressure. The arch had been erected as a pair of cantilevers from each side extending 420 feet out beyond the supports, and when the closure was made the two arms came together within a quarter of an inch of the computed value. Such a result involving the "accuracy of the calculation and design of the entire steel work, the exactness with which the bearing shoes or skewbacks were placed, and the perfection of the shopwork" has been truly characterized as phenomenal. In order to reduce secondary stresses to a minimum the members were bolted up during the cantilever erection and the bolts replaced by rivets after the closure of the arch rib.

Recent years have witnessed the introduction and development of arches of concrete and concrete steel construction. In the latter kind a small amount of steel is imbedded in the concrete in order to resist any tensile stresses that may be developed. During this period more than 150 concrete steel bridges have been built in this country. In the same year in which the highest metallic arch was completed, the five concrete steel arches of the bridge at Topeka, Kan., were finished. The largest one has a span of 125 feet and still remains the largest span of this type in America, although it has been exceeded in Europe. Considerably larger spans are to be built, while others are included in the accepted design for the proposed memorial bridge at Washington.

It is the smaller steel structures which are destined more and more to be replaced by arches of this material. The steel bridges require painting at frequent intervals, constant inspection, occasional repairs and finally replacing by a new structure after a relatively short life, on account of rust and wear, unless it be required even sooner on account of a considerable increase in the live load. The concrete arch requires practically no attention except at very long intervals.

The safety of operating the traffic makes it desirable to have as few breaks as possible in the regular track construction of a railroad, and this constitutes an additional reason why concrete or stone bridges are being substituted for the smaller openings. The decreasing cost of concrete tends to an extension of this practice to openings of increasing size. Recently, however, a bridge was completed which marks a decided departure from previous practice. The Pennsylvania railroad built a stone bridge, consisting of forty eight segmental arches of seventy feet span, at the crossing of the Susquehanna river at Rockville, Pa. It is fifty two feet wide, accommodates four tracks, and cost a million dollars. The bridge has not only the advantage of almost eliminating the cost of maintenance, but it also has sufficient mass to withstand the floods which occasionally wreck the other bridges on that river.

Of movable bridges the largest swing span existing was erected in 1893 at Omaha over the Missouri river, its length being 520 feet. Two years later a four-track railroad swing bridge was built by the New York Central railroad over the Harlem river in New York city, which is only 389 feet long between centers of end pins, but which weighs about 2,500 tons, and is accordingly the heaviest drawbridge of any class in the world.

During the last decade a remarkable development was made in drawbridge construction by the modification and improvement of some of the older types of lift bridges and the design of several new types. At south Halsted street a direct lift bridge was built in 1893 over the Chicago river, in which a simple span 130 feet long and 50 feet wide is lifted vertically 142½ feet by means of cables to which counterweights are attached. Formerly only very small bridges of this kind were used, as those, for instance, over the Erie canal.

In 1895 a rolling lift bridge over the Chicago river was completed. In this new design as each leaf of the bridge rotates to a vertical position it rolls backward at one end. When closed the two leaves are locked at the center, but they are supported as cantilevers. This form has been found to have so many advantages for the crossings of relatively narrow streams, where an unobstructed waterway is required and the adjacent shores are needed for dock room, that a score of important structures of this class have been built in different cities. The largest span that has been designed is 275 feet between centers of supports, while the widest is to accommodate eight railroad tracks crossing the Chicago main drainage canal.

About the same time and under similar conditions another type of bascule bridge was built at Sixteenth street, Milwaukee, in which, as each leaf moves toward the shore, one end rises and the other falls, so that its center of gravity moves horizontally, thus requiring a very small expenditure of power to operate the bridge.

Several improved forms of hinged lift bridges have also been designed and built in Chicago and elsewhere. In a small bridge erected in 1896 on the Erie railroad in the Hackensack meadows there is only a single leaf hinged at one end and lifted by a cable attached to the other end. The counterweight rolls on a curved track so designed as to make the counterbalance equally effective in all stages of opening or closing the bridge.

A novel bridge over the ship canal at Duluth is different from any other type in this country. The general scheme is similar to a design made by a French engineer who built three of the structures in different countries. It consists of a simple truss bridge 393 feet 9 inches long, supported on towers at a clear height of 135 feet above high water. Instead of supporting the usual floor of a highway bridge it supports the track of a suspended car which is properly stiffened against wind pressure and lateral vibration, the floor of the car being on a level with the docks. This ferry is operated by electricity. The loaded car, its hangers, trucks, and machinery weigh 120 tons. In the French design a suspension bridge was used instead of the simple truss bridge.

A bridge across the Charles river between Boston and Cambridge deserves special mention and marks a decided advance in the growing recognition on the part of municipal authorities of the importance of æsthetic considerations in the design of public works. It consists of 11 spans of steel arches whose lengths range from 101½ to 188½ feet. Its width is 105 feet between railings. It is claimed that this bridge is not only one of the finest structures of its kind in this country, but a rival of any in the old world. Its length between abutments is 1,767½ feet, and its cost was about two and a half millions of dollars.

The problems incident to the replacing and strengthening of old bridges frequently tax the resources of the engineer and demonstrate his ability to overcome difficulties. Only a few examples will be cited to indicate the character of this work. In 1900 the Niagara cantilever bridge had its capacity increased about 75 per cent by the insertion of a middle truss without interfering with traffic. In 1897 the entire floor of the Cincinnati and Covington suspension bridge was raised four feet while the traffic was using it. It may be of interest to state that the two new cables, 10½ inches in diameter, which were added to increase the capacity of the bridge have just about three times the strength of the two old ones, 12½ inches in diameter, and which were made a little over thirty years before. In the same year the old tubular bridge across the Saint Lawrence river was replaced by simple truss spans without the use of false works under the bridge and without interfering with traffic. On May 25th of this year the Pennsylvania railroad bridge over the Raritan river at New Brunswick, N. J., was moved sidewise a distance of 14½ feet. Five simple spans 150 feet long and a drawbridge of the same length, weighing in all 2,057 tons, were moved to the new position and aligned in 2 minutes and 50 seconds. The actual time that the two tracks were out of service were respectively 15 and 28 minutes. On October 17, 1897, on the same railroad near Girard avenue, Philadelphia, an old span was moved away and a new one, 235 feet 7 inches long, put in exactly the same place in two minutes and twenty eight seconds. No train was delayed in either case.

INTERURBAN RAILWAYS—ECONOMIC, FINANCIAL AND SOCIAL FEATURES.

BY EDWARD DANA DURAND.

[Edward Dana Durand, economist and special expert agent in the United States census office, on street railways and electric light plants; he was born Oct. 18, 1871, at Romeo, Mich., and was graduated from Oberlin college in 1893; from 1895 to 1897 he was legislative librarian in New York state library and the next year was assistant professor of administration and finance in Stanford university; in 1900 he became secretary for the United States industrial commission, and two years later instructor in economics at Harvard; the same year he was made special expert in the United States census office, on street railways and electric light plants; he is the author of Finances of New York City and contributes to various economical reviews on economical and political topics.]

The conditions of business of the typical modern interurban railway differ so greatly from those of the ordinary street railway as to require special discussion. This subject has a peculiar interest because of the fact that the interurban business is of recent development, most of the faster and longer lines having been constructed within the past five years. The changes now taking place are so rapid that the census statistics covering the year ending June 30, 1902, will soon be out of date. Many new interurban railways were indeed under construction during the census year.

Many of the railways combine urban with interurban characteristics and traffic in such a way as to make attempts to classify them unsatisfactory. Such railways in their returns made no distinction between their strictly urban business and their interurban and suburban business, and in every case they have necessarily been treated as a unit and classed either as urban or interurban. In making this classification, therefore, it has been necessary to adopt more or less arbitrary rules. It will be recalled that the general rule followed in this respect has been to consider as interurban any railway which has more than one-half of its trackage outside the limits of incorporated municipalities; and to consider as a "fast, long" interurban any railway more than 15 miles in length, which has two-thirds or more of its trackage outside the limits of municipalities and which operates cars at a maximum speed of 20 miles or more per hour. On the basis of these rules, various companies have been classed as interurban the urban traffic of which might perhaps be found, if the information were at hand, to exceed somewhat their interurban traffic. The railways classed as "other" interurban railways are, however, much more heterogeneous in character than the "fast, long" interurbans, though even among the latter there are several which have a considerable amount of strictly urban traffic.

It would be interesting, if possible, to distinguish more specific classes among the interurban railways. For instance, a distinction might be drawn between interurban lines proper and suburban lines, between companies which do a considerable proportion of their business within the limits of cities and those which do only a small proportion within such limits; and between lines which depend largely upon seasonal traffic and those which have traffic fairly well distributed throughout the year. The different railways grade into one another so imperceptibly in these respects, however, that, in the absence of more detailed information regarding the nature of the business of each company, such classification has been deemed impracticable, and it has been found necessary to group together all interurban railways except those of the special class of fast, long lines above defined.

Because of the necessary imperfection of the classification of interurban lines it is worth while, in order to get another view regarding the development of interurban railways, to consider the statistics which show the amount of trackage lying outside the limits of incorporated cities and towns. This distinction is also an imperfect one, for the reasons that the limits of an incorporated place are often not identical with the limits of the area of dense population, and that there are many essentially urban communities, especially in New England, which are not incorporated. In order to avoid the second of these difficulties, some of the railway companies, in reporting their statistics of trackage, adopted more or less arbitrary limits to distinguish urban from rural districts in unincorporated places. In Massachusetts, however, where so many essentially urban communities are not politically separated from the unincorporated towns in which they lie, a large proportion of the companies were unable to make a satisfactory classification of their trackage, and the statistics of urban and non-urban trackage for the entire state have therefore been omitted in making up the totals for the country.

Despite these qualifications, however, the statistics of trackage lying outside the limits of incorporated places or other essentially urban communities, undoubtedly show fairly well the amount of track which is extraurban, and thus throw an interesting light on the extent to which suburban and interurban railways have been developed. Out of a total trackage of 20,063.82 miles exclusive of Massachusetts, 6,855.58 miles, or 34 per cent, were reported as lying outside municipal limits or the limits of urban communities as determined by certain companies. This item obviously has no direct relation to that of the total trackage of those railway companies which are classed as interurban, although it so happens that the two are nearly the same.

The states which have the largest amount of electric railway mileage outside of municipal limits are Connecticut, with 338.83 miles, or about three fifths of the total trackage in this state; Indiana, with 278.34 miles, or 43 per cent of the total trackage; Maine, with approximately 200 miles, or about three fifths of the total; Massachusetts, with probably two thirds of the total of 2,525.65 miles extraurban (exact figures not available); Michigan, with 558.62 miles, or 54.6 per cent; New Hampshire, with 85.99 miles, or 51.3 per cent; Ohio, with 1,278.55 miles, or 54.3 per cent; Pennsylvania, with 1,113.54 miles, or 44.9 per cent; and Virginia, with 197.89 miles, or 55.1 per cent. New York and Illinois have also large absolute amounts of electric railway trackage outside of municipal limits, but their urban railways are so extensive that the proportion of the total trackage which lies outside of municipal limits is comparatively small.

The conditions which favor the development of interurban railways may be considered from the standpoint of amount of traffic and from that of cost of service. From the standpoint of traffic the favoring conditions are (1) a comparatively dense population, arising from many and populous towns and villages; (2) connection with a large city, which attracts travel from the smaller towns and rural districts, and from which also summer traffic may be carried to resorts and rural districts; (3) general material prosperity and intelligence. From the standpoint of cost the important consideration is that the territory to be served shall be comparatively level, and otherwise free from physical obstacles to economical construction and operation.

It will be found by detailed study of the existing interurban railways that in sections where they are most conspicuously developed several or all of these conditions are present.

In proportion to its area, Massachusetts has much more electric railway mileage than any other state. The 2,525.65 miles of electric road in that state represent on an average about one-third of a mile of track for each square mile of area. Except for the Boston system, nearly all the railway companies in this state are classed as interurban, although several of those which are so classed, because more than half of their trackage lies in essentially rural districts, probably carry more than half of their passengers within urban communities. The cities of Massachusetts lie so near together that it was a natural process for the street railways already existing in them to reach out and become united, and then to extend to the many prosperous villages in the vicinity. The agricultural population of Massachusetts, however, is comparatively sparse and has not contributed materially to the patronage of the electric railways. It is now possible to traverse the whole length and breadth of this state on trolley cars or to go from any important town to almost any other in this way. The cars operated on the interurban lines in Massachusetts are for the most part similar in size, motive power, and speed to those used in the cities.

What is true of the interurban railways in Massachusetts is largely true also of those in Connecticut and Rhode Island, and of those in the more densely populated parts of New Hampshire and Maine, particularly along the coast where summer traffic is an important element. Pennsylvania is another state in which there has been extensive interurban development, but in which many railways show no sharp distinction between urban and interurban business. The rich agricultural and manufacturing regions in the east and southeast, the anthracite mining regions in the northeast, and the densely populated valleys of the western part of the state are the chief centers of interurban railway development. A few of the lines in Pennsylvania are equipped for heavy traffic at high speed. In New York interurban electric railways are found chiefly in the upper Hudson valley, in the Mohawk valley, and in the vicinity of Buffalo. High-speed electric cars now operate from Hudson to Albany, and from Albany north through Saratoga and Glens Falls to Warrensburg, a total distance of nearly 150 miles.

The central states, Ohio, Michigan, Indiana, and Illinois, possess the most extensive and efficient high speed interurban railways in the country, and illustrate most clearly the future possibilities of this method of transportation. Here coexist all the circumstances already mentioned which contribute to favor the development of such railways. In these states a clear distinction usually appears between urban and interurban lines, and, as a rule, the two classes of railways are controlled by different corporations. The fast interurban railways of these states are tending more and more to compete with steam railways for passenger traffic, even for rides of considerable length. The electric lines have been and are still being constructed with a view to ultimate combination into extensive systems. While the links have usually been built only where the local business itself was expected to prove profitable, the possibilities of through service have always been kept in mind. Already, in several places, the meeting of such shorter electric lines has made it possible to take long journeys by electric cars, in some cases without the necessity of change. Combination of detached lines into systems is being found, as was the case with steam railways, to bring many advantages to the public in the way of through cars and well-adjusted schedules, as well as to the owners in the way of economical operation.

The southern shore of Lake Erie is skirted by electric lines from the northeast corner of Ohio to Toledo, and a line now connects Toledo with Detroit. The system from Cleveland to Toledo, which is now controlled by the consolidated Lake Shore Electric railway company, has 155 miles of main track. From Cleveland several other important electric railways radiate to the southeast, south, and southwest for distances of 50 miles or more, and it is expected that these lines will soon be extended to Pittsburg and Columbus. A group of four connecting trolley roads reaches from Toledo, through Findlay, Lima, Dayton, and Hamilton, to Cincinnati. The two longest links of this chain are controlled by a single syndicate, and it is probably only a question of time when the others will fall into the same hands.

Another important group of railways controlled by a single syndicate extends from Columbus to Springfield and Dayton, and is expected soon to reach Cincinnati, and, by connections with other roads, Toledo also. A steam railway between Wheeling, W. Va., and Zanesville, Ohio, is now being equipped for electric operation, and when this is completed a chain of electric railways will extend from Wheeling, W.Va., through Columbus and Dayton, to Indianapolis, a distance of about 365 miles.

The railways radiating from Detroit are likewise extensive and highly efficient in organization and operation. One line reaches west to Jackson, another northwest to Flint, and a third extends northeast to Port Huron, skirting Lake St. Clair. Each of these lines is more than 75 miles long, and with their interlacing branches they make an elaborate system. Another railway west from Jackson connects at Battle Creek with a line reaching nearly across the state. Probably within a short time connections will be made with Grand Rapids and with the two systems which extend from there to Lake Michigan.

Indiana rivals Ohio in the extent of its interurban railways. No less than nine interurban lines radiate from Indianapolis, and three others are under construction. Some of these run lines 75 miles or more. Perhaps the most extensive interurban railway system in the country is that of the Union Traction company, which extends northeast from Indianapolis to Muncie and Marion and north to Kokomo and Logansport. Additional lines connecting the present systems by direct routes with Chicago, Toledo, Cincinnati, and St. Louis are projected.

Several important electric railways also radiate from Chicago. One of these, the Aurora, Elgin and Chicago, which uses the third rail system, is conspicuous for its heavy construction and its high speeds. Considerable progress has also been made in the construction of fast, long electric railways in eastern Wisconsin, in parts of Iowa, in eastern Missouri in the vicinity of St. Louis, in the neighborhood of Los Angeles, Cal., and elsewhere.

Because of differences in the length of journeys on the longer interurban railways, there is much less significance in the statistics of the number of passengers carried and the relation of that number to trackage and car mileage than in the case of urban railways. Few, if any, interurban railways have as yet adopted the practice of steam railways in recording the distances traveled by passengers. The results of operation of fast, long interurban lines can, therefore, be satisfactorily studied only through financial data. Financial statistics can not be presented for companies by name. However, averages or totals for states or for the country as a whole, correspond so little with the actual conditions on many individual railways that it has been considered desirable to present certain financial data for specific companies, omitting the names and other means of identification.

Confining attention to full time companies without commercial lighting plants, the average earnings from all sources per mile of track for all companies in 1902 were $3,308, of which $3,032 was derived from passengers and $185 from freight, mail, and express. Of the 40 companies in this class 9 earned less than $2,000 per mile of track. At least 6 of these, however, did not have all their trackage in operation throughout the whole census year. Nine companies earned from $2,000 to $3,000 per mile of track; 11, the largest group, from $3,000 to $4,000; 4 from $4,000 to $5,000; and 7 more than $5,000 per mile. While some of the companies with high earnings per mile of track derived a considerable part of their revenue from passengers carried within the limits of cities, others that earned $4,000 or more per mile derived much the greater part of their earnings from strictly interurban business.

The freight, mail, and express business of the interurban railways shows such widely differing stages of development that an average for all companies is not significant. Eight of the 53 companies have earnings from these sources equal to more than one tenth of their earnings from passengers, and of these 8 companies 3 have freight, mail, and express earnings equal to more than one third of their revenue from passengers. All of the 4 companies in Michigan operating the entire year do an important freight and express business, and the same is true of the interurban lines of the Detroit United railway company. Among other companies whose freight and express business is important may be mentioned the Indianapolis and Eastern railway company, the Eastern Ohio traction company (Cleveland to Garrettsville, etc.), the Cleveland, Painesville and Eastern railroad company, the Dayton, Springfield and Urbana electric railway company, the Toledo and Western railway company (Toledo to Adrian, Mich.), the Mahoning Valley railway company (Youngstown, Ohio, to Newcastle, Pa.), the Los Angeles Pacific railroad company, the Erie traction company (Erie to Cambridge Springs, Pa.), and the Albany and Hudson railway and power company.

The ratio of earnings to car mileage on interurban railways is much more nearly uniform than the ratio of earnings to trackage. Moreover, this figure furnishes a basis for comparison of the financial operations of part time and full time roads which the ratio of earnings to trackage did not permit. The total railway earnings of the three groups of interurban companies already referred to are equal to 20.6 cents per car mile and the passenger earnings are equal to 20.3 cents per car mile. No great difference appears in these ratios as among the three groups of companies. Of the 52 companies for which car mileage was reported, 6 have railway earnings of less than 15 cents per car mile, 16 have earnings of from 15 to 20 cents, 19 from 20 to 25 cents, 10 from 25 to 30 cents, and 1 more than 40 cents per car mile.

The operating expenses per car mile for full time interurban railways without commercial lighting average 12.4 cents, and those for companies operating only part of the year, most of which do not furnish commercial lighting, 13.7 cents. Some of the companies report remarkably low ratios of operating expenses, 10 showing less than 10 cents per car mile. Only 9 of the full time companies without commercial lighting have operating expenses exceeding 15 cents per car mile, and several of these cases are easily explained by temporary or exceptional causes. The total operating expenses of companies which do an extensive lighting business are naturally relatively high per car mile.

The average ratio of operating expenses to operating earnings for the 53 fast, long interurban railways is 59.8 per cent. For full time companies without commercial lighting the ratio of expenses to earnings is 59.9 per cent. Much the greater proportion of the companies have operating ratios between 50 and 70 per cent, but 8 report a ratio of less than 50 per cent and 13 a ratio exceeding 70 per cent. The financial results of interurban railway business must be considered on the whole very satisfactory.

Several interurban companies present statistical comparisons showing the growth of their earnings. None of the companies has been in operation more than a few years, but in several instances a marked increase of earnings has taken place within that time. Thus the Eastern Ohio traction company states that its passenger earnings were 24 per cent greater in 1902 than in 1901. The Detroit, Ypsilanti, Ann Arbor and Jackson railway in 1901 had, with the same trackage, about 20 per cent more passenger earnings in 1901 than in 1898. Much more remarkable has been the growth of freight traffic on some of the lines. The report of the railway last mentioned shows that freight earnings are increasing by from 20 to 30 per cent each year. The Schenectady railway (Schenectady to Albany, N. Y.), during the twelve months from July 1, 1902, to June 30, 1903, earned about three and one half times as much from freight and express as during the six months immediately preceding.

Much interest attaches to the question of the relation between the amount of earnings on interurban railways and the population served. Only rough approximations can be made on this subject. Conditions peculiar to each railway make it impossible to draw from its experiences definite conclusions that can be regarded as typical. The greatest difficulty is found in determining the extent of the population which is to be considered as tributary to a given railway.

For example, where an interurban railway connects a group of small towns with a large city, the resident population of the small towns usually furnishes much more traffic in the aggregate than the resident population of the city, although the inhabitants of the city may greatly outnumber those of all the other towns. The latter contributes some traffic, but it would be obviously improper to combine the population of the large city with that of the small towns in calculating the per capita traffic. Where two large cities are connected by an electric railway, which also serves intermediate towns, the traffic furnished by the cities is likely to be somewhat greater than where only a single city is served. The amount of traffic will depend largely upon the distance between the two cities and the comparative speed and charges of the electric and steam service. But even where two cities are connected in this manner it would likewise be improper to count the population of the cities in the same way as that of the smaller towns in determining the relation of traffic to population. In other cases interurban railways connect only towns of medium or small size. There is ordinarily less to attract travel on such a railway, and the ratio between earnings and population served may be expected to be lower than the ratio in the case of railways connecting with large cities.

It is quite impossible from the available statistics of population to determine the number of the inhabitants of rural communities who can be considered as tributary to an interurban railway. Ordinarily the township, which is the unit for reporting the population, is of such large area that only a small portion of its inhabitants have access to a railway running through it. In some cases, to be sure, interurban lines draw a considerable proportion of their traffic from the farming class. Usually, however, much the greater part of the traffic is furnished by the inhabitants of towns.

In discussing the broader questions regarding the social and economic significance of interurban railway traffic, it is difficult to avoid entrance into the domain of prophecy. Some of the electric railways have already made such progress in methods that certain prophets look forward to the complete superseding of steam traction by electric traction. However this may be, it is evident that, even if the electric railways confine themselves to the methods already widely prevalent, they are bound to become a social and economic factor of enormous importance. Remarkable benefits have already been realized from the existing interurban lines, and the extension of such railways to a large proportion of our more prosperous communities seems but a matter of a short time.

The electric interurban railways possess, in contrast with steam railroads, several peculiar characteristics which directly affect their methods of operation, and these in turn determine the amount and character of their traffic.

The greatest difference between the electric and the steam railway lies in the fact that the former operates cars each of which has its own motors, supplied with energy from a single distant source, while the cars of the latter are moved by a separate locomotive which generates its own power. The economy of large scale power production is secured by the electric railway through the construction of a central station. It is, therefore, practically as cheap to run electric cars separately as to run them in trains. On the other hand, the cost of operating a steam railway is greatly reduced by increasing the size of engines and the length of trains. Steam operation, therefore, tends to infrequent service, while electric operation lends itself to frequent service.

In the middle west, where the interurban railways usually connect rather small and quite widely separated towns with one another or with larger cities, the passenger cars run, as a rule, once each hour, though sometimes more frequently. The steam trains which actually stop at these minor towns number ordinarily not more than four or five each way per day. The very smallest country villages on the steam roads often have still less frequent train service. Where, as in the more densely populated parts of Massachusetts, the urban communities connected by electric lines are larger and nearer together, the frequency of the electric service is often much greater than that in the middle west, and such frequency of service means great convenience and saving of time to patrons.

The fact that single units of comparatively light weight are operated upon electric railways permits stops to be made much more quickly than with heavy steam trains, and likewise permits a much more rapid acceleration after the start. Acceleration is also favored by the nature of electric power and motors. It is, therefore, possible for interurban cars to make comparatively frequent stops while maintaining a high average speed. This fact also tends greatly to increase patronage.

For reasons which need not be taken up here electric traction is cheaper for short distances and light traffic than steam traction. Interurban electric railways have, therefore, found it possible to charge fares materially below those of the steam railways, and as a result have not merely taken away traffic from the latter, but have developed traffic which otherwise would not have existed at all. The relation between low fares and low operating expenses is reciprocal. Low operating costs make low fares possible, and on the other hand the reduction of charges stimulates traffic and thereby reduces operating costs and still more fixed charges per passenger.

In most sections of the country the local fares of steam railways for one way tickets are about 3 cents per mile. On many electric railways, which connect closely neighboring cities and towns and which have dense traffic, the charges per mile are materially less than those above indicated. This is true, for instance, in Massachusetts.

A prominent steam railway company, operating in several states, submitted to the bureau of the census a detailed list of all towns connected both by its lines and by electric railways, with the respective rates of fare in each case. The fares of the steam road for one way tickets were from one and one half to five times as much as those of the parallel electric roads. Broadly speaking, the steam railway fares averaged about double those of the electric lines.

By running upon the public streets when they enter a city or town, and by making frequent stops within municipal limits, electric railways become usually much more accessible to passengers than steam railroads, which, as a rule, have only a single station in a town, and that, perhaps, at some distance from its business center. The electric railway is also able to create in addition to its interurban traffic a considerable amount of new traffic within the limits of towns. On the other hand the electric car suffers a considerable disadvantage in the eyes of through passengers, because of the necessity of reducing its speed while passing through municipalities. This matter is less serious in the small towns, but in the larger cities the speed of cars is so much reduced, and the distances to be covered at a slow pace are so great, that the duration of the journey of many interurban passengers is materially augmented. Ultimately many interurban railways will probably secure entrance into cities on private rights of way, or on elevated or underground tracks, but the heavy expense involved will delay the adoption of this policy.

Other peculiarities of interurban railway service, although they are of less importance, may be mentioned. One of these is the fact that the electric car can surmount grades and pass curves more readily than a steam train. This enables electric railways often to take shorter routes than the steam roads, and sometimes to reach villages or rich rural sections not considered accessible by the steam railways. Again electric railways, being capable of earning a profit from purely local business, are often built to connect towns directly, where it was formerly possible to travel from one to the other only by a roundabout journey and a change of cars. The freedom from smoke is a material advantage of electric over steam railways. This advantage is particularly appreciated in the summer, when it permits the electric lines to operate open or semiconvertible cars, giving the patrons the pleasure of a fast open air ride.

The importance of the advantages possessed by electric railways for local traffic is sufficiently shown by the extent of their business and by the financial results, which have already been discussed. The interurban railways have greatly increased the aggregate amount of travel in those sections where they exist, the number of passengers carried by the electric lines being usually materially greater than the number formerly carried between the same points by the steam railways. The president of the Detroit, Ypsilanti, Ann Arbor and Jackson railway company recently said:

"The increased travel is new business developed by the electric road from the population that very seldom travel by steam." The representatives of an important company in Ohio said they were informed that, before the electric railway was built between two particular cities of medium size, the steam railroad did a business between them of about $2,000 per month. The electric railway now does three times that amount of business with a very much lower rate of fare, while the steam railroad seems to be handling about the same volume of business as before.

A part of this new passenger traffic represents the patronage of farmers and their families. To the agricultural population as such the steam railways offer no special conveniences. The farmer must go to town to take the train. If he lives on an electric railway, the car may stop at his very door. Most of the interurban companies which report on rural patronage estimate that from 5 to 20 per cent of their traffic was from the rural population. That the proportion is not larger is due chiefly to the fact that farm dwellings are so widely scattered. A system of interurban railways connecting all the towns and villages in a given section would be conveniently accessible to only a fraction of the agricultural community.

The importance of the service of the electric railway to such of the rural population as come within its reach can scarcely be overestimated. The farmer and the members of his family can go to the neighboring village at the time most convenient to them, and far more quickly, cheaply, and comfortably than by team. In many cases they even become accustomed to make frequent trips to larger cities at a greater distance. The contact with town and city life which is thus made possible contributes greatly to the breadth of view, culture, and happiness of the farm family. The accessibility to markets and shops improves the table and dress and increases the comforts of the home. The social life, the amusements, and the varied interests of the town are made accessible to the country dweller as never before. The children are enabled readily to avail themselves of the superior school facilities of the town. In fact, the electric railway has doubtless contributed materially toward the advancement of the modern movement for the consolidation of rural schools.

Even more important has been the new traffic created by the trolley railway from among the inhabitants of small and medium sized towns. The greater part of the traffic of most interurban railways either moves between such towns or between them and larger cities. The increased accessibility of the cities to village dwellers is one of the most important services of interurban railways. Many of the interurban lines of the miscellaneous group connect smaller towns only, but it has been found by experience that those lines which reach large cities are the most profitable. In such cities the shopper finds greater variety and often lower prices than at his home town. There the pleasure seeker finds opportunities for enjoyment vastly superior to those in the small towns. Some interurban electric railways have adopted the practice of running special theater cars.

The convenience of the electric service has greatly increased the amount of travel for purposes purely of pleasure and of social intercourse. From the social standpoint it is probably safe to say that these railways have proved a greater benefit to the women of the communities they serve than to the men. The trolley railways widen the circle of acquaintanceship. Not infrequently special cars are chartered by parties for picnics or for some other social object. Interurban railways likewise offer facilities for travel, both from the small towns and from the large cities, to outing places and other pleasure resorts, such resorts being maintained in a number of instances at the expense of the interurban companies themselves.

Some of the longer interurban railways are seeking to develop a form of long distance suburban traffic—that is, the traffic of persons who go every day to their business in the city and live in the small town. One method adopted to further this object is that of the operation of "limited" cars on a fast schedule on several railways. Thus there is a "limited" service between Cleveland and Painesville, which permits business men to live in the smaller town and yet to reach their offices in the city, 25 miles away, within an hour. Three "limited" cars are also run each way daily between Toledo and Cleveland.

The significance of the electric railway as a factor in the transportation of commodities lies chiefly in two directions. In the first place it carries considerable quantities of goods between town and country. This transportation business it has largely created, for it either carries goods which were not carried at all before, or else it carries goods previously transported by wagon rather than by steam railway. The farmers who live within a reasonable distance of the electric line can send their milk, butter, provisions, vegetables, and fruits to market far more promptly and easily than before. In this way the nature of farm industry has been materially affected in some communities where the freight business of the electric railways has been highly developed. Moreover, the farmer can get groceries, meats, dry goods, and other light articles from the town much more easily than before the advent of the railway. In the second place, the electric railway furnishes much more frequent and prompt service between small towns, and between these towns and large cities, than is furnished by the steam railways. This is the case not only as compared with the light freight traffic on steam lines but even as compared with their express traffic.

People living in the small towns served by electric railways can now obtain packages of merchandise from the cities more cheaply and promptly than ever before. Local merchants are already making extensive use of the interurban lines to obtain smaller consignments of merchandise.

The electric railways have in most instances not yet attempted to carry heavy freight. They usually do no carload business and have no arrangements for exchanging freight with the steam railways. It has been held by the New York courts that a steam railway, as a common carrier, is bound to exchange freight with electric lines and to furnish the same facilities for doing so that it furnishes to steam railways. Many representatives of the interurban roads express the opinion that the business of handling express and light freight may be greatly developed, but that there is little to be gained by entering the field of general freight traffic. The cases where electric lines have undertaken a general freight business are usually explained by exceptional local conditions.

At this point the question arises as to the economic effect of electric interurban railways upon the business of small towns. The class most likely to be affected in its economic interests is that of the local merchants. It scarcely seems probable that the location of manufacturing industries can be materially affected by interurban railways. These railways doubtless tend in some measure to increase local population in cases where the town is near enough to a great city, or to a small industrial center undesirable for residence purposes, to draw as residents people who are engaged in business elsewhere. For example, part of the recent increase in population in Elyria, Ohio, consists of those employed in the new steel and other industries at Lorain, a few miles distant. The small town may also draw some permanent residents from the agricultural sections, who, because of the improved methods of transportation, can reach their farms easily. Increased population, of course, benefits retail trade and local economic interests generally. On the other hand, the railway may tend to take away some of the former patronage of retail merchants, not merely because of the convenience with which customers can go to the larger cities to buy goods, but also because of the convenience with which goods ordered by mail can be delivered. The competition is likely to be felt most keenly by merchants who handle the most valuable and least perishable classes of commodities. But even if there were a net economic injury to the local merchants, the economic advantages to the buyers of goods would probably more than offset the injury, and, from the broad social standpoint, may properly be considered as more important.

In order to ascertain the opinions of merchants themselves regarding the effects of electric railways, the bureau of the census addressed schedules of inquiry to prominent dealers in numerous towns that are connected with larger cities by fast and efficient interurban roads. These schedules were sent chiefly to dealers in dry goods, clothing, and general merchandise. A considerable number of replies were secured, mostly from towns of between 3,000 and 20,000 inhabitants. Four of the most important questions contained in the schedule were as follows:

"Have you observed any decline in your trade because people of the town take advantage of the electric railway to go to the larger city to buy goods?

"Have you observed an increased patronage from farmers and their families as a result of the development of the electric railway?

"What is the general feeling among merchants and business men in your town as to the advantage or disadvantage to them from the construction of interurban electric railways?

"Has the interurban railway facilitated your business in any other way, as by enabling you to get goods from the city more promptly, to go to the city to make wholesale purchases, or otherwise?"

A marked diversity of opinion appears among the replies. Doubtless the differences are partly due to the "personal equation," but in part they must represent differences in actual conditions. Whether the effect of the opening of an electric railway between a town and a large city will be beneficial or injurious to the town merchants depends upon the size of the town, upon its distance from the city, upon the comparative excellence of the shops, upon the character of the rural population surrounding the town and the extent to which that population is served by the railway, and upon other similar causes.

Of the merchants in towns of less than 5,000 inhabitants, five express in one form or another the opinion that the interurban railway has been detrimental to their interests, eight hold that they have been benefited, two are indefinite, and two do not reply. In most cases the persons who reply think that the general opinion of merchants agrees with their own.

Five merchants in twenty towns of more than 5,000 inhabitants declare that they have suffered injury from the electric railway. One of these towns, Evanston, however, is essentially a suburb. The merchants of Ypsilanti and Mt. Clemens are particularly emphatic. These towns lie twenty miles or more from Detroit, but they have highly efficient electric service. They are in a rich agricultural region, and one might expect some increase in trade from farmers who patronize the electric railway, but such increase is denied in these reports.

A majority of the merchants of this group, however, assert that the local retailers have derived a benefit. Several of the replies, however, come from towns of considerable size, situated at some distance from any large city. The new railways naturally bring trade to such towns from the smaller villages. Several of the dealers of this group, especially in the larger and more distant towns, emphasize that point strongly. Numerous dealers in towns of less than 5,000 inhabitants, as well as in the larger towns, report an increase in their country trade as the effect of the trolley lines, three referring particularly to the advantage in this respect during inclement weather. Several merchants also speak of the advantage which the railway has conferred in enabling them conveniently to go to the city to make wholesale purchases, and also in enabling them, through the express and freight service, to get goods delivered more promptly, thus avoiding the necessity of keeping large stocks or of disappointing customers.

Some of the replies from merchants are very suggestive. One from Massillon, Ohio, says:

"Complaints are occasionally heard from merchants and dealers in small places and country towns that the interurban lines would carry their trade to the larger places, but I think in most cases they have been more than compensated by the extra number of people coming in and going out all the time and, as a rule, are very well satisfied after the lines are established. The old idea of carrying off trade and scaring the horses is dying out, and we predict that before long the electric lines will be carrying the bulk of the farmers' produce to market."

The following is from a large concern in Jackson, Mich.:

"We anticipate that trading centers, both large and small, will be considerably benefited by the extension of electric car service. If we lose by customers going to the larger city in some instances, we gain by an increased number coming from smaller places to us, and smaller towns will benefit by the ease with which farmers can get to them."

In opposition to the opinions of these two merchants as to the benefit derived from the electric railway by the smallest towns should be noted two or three replies from towns which have experienced a benefit, in which the opinion is expressed that retail trade in smaller towns has suffered. Had more numerous replies been secured from towns of less than 2,000 inhabitants, it is possible that the proportion of unfavorable opinions would have been larger.

There can be little doubt that more people than formerly go from the small towns reached by electric railways to the cities to buy certain classes of goods. In some, and possibly a majority of instances, this loss to the local merchant is more than offset by the increased population of the town and by the increased patronage from the farming classes. That the merchants in the large cities served by interurban railways have profited to some extent is beyond question. The bureau of the census, in fact, received replies to its schedule of inquiries from a number of merchants in such towns as Akron, Dayton, and Syracuse, which asserted that trade had been materially increased by the interurban lines. The electric railway not merely creates new passenger traffic, but it creates at the same time a new demand for goods and augments the total retail trade of the sections served.

The frequent service, convenient stops, and low fares of interurban electric railways have, in many instances, seriously affected the local traffic of steam railways connecting the same towns. It is probable that the increase in the average length of journeys on steam railways, as revealed by official statistics, is in part attributable to the relative decline of local traffic through electric competition. During the five or six years prior to 1897 the average length of passenger rides on the steam railways had not increased by more than 5 per cent. On the other hand, the average ride increased from 25.04 miles in 1897 to 30.3 miles in 1902, or 21 per cent.

There is considerable difference of opinion as to whether, in general, electric railway competition up to the present time has been injurious to the interests of the steam railways. In order to ascertain the views of railroad officials themselves on this subject, inquiries were addressed to the traffic officers of the leading railroads in the northern and eastern states. Replies were received from fourteen of these companies, namely: The Baltimore and Ohio; Boston and Albany; Boston and Maine; Chicago, Cincinnati and Louisville; Erie; Flint and Pere Marquette; Lake Erie and Western; Lake Shore and Michigan Southern; Lehigh Valley; New York, Chicago and St. Louis; New York, New Haven and Hartford; Pennsylvania; Toledo, St. Louis and Western; and the Wabash.

Of the fourteen replies received, one states that increase in local steam railway traffic between points served by the electric railways has been checked, while all the rest say that local traffic has been reduced, in most cases very sharply. The distance within which electric competition is at present effective naturally varies with the efficiency of the electric service.

Statistics showing the effect of interurban competition have been published in various railroad and other periodicals. Thus, one journal states that on the Lake Shore and Michigan Southern railroad the number of local passengers carried between Cleveland and Oberlin and intermediate points fell from 203,014 in 1895 to 91,761 in 1902, and the number carried between Cleveland and Painesville fell from 199,292 to 28,708. On the New York, Chicago and St. Louis railroad the passengers between Cleveland and Lorain fell from 42,526 in 1895 to 9,795 in 1902.

Some of the representatives of interurban railways assert that whatever loss the steam railways suffer in local traffic is offset by the gain in long distance traffic induced by the electric lines. The fact is pointed out that much of the passenger traffic on the electric railways is new traffic. It is suggested that the habit of traveling is being developed among people who formerly seldom traveled at all, and that this fact, combined with the fact that steam railways have been made more accessible through connection with electric lines, leads to the conclusion that steam railway systems will ultimately be benefited, if they are not already deriving benefit. An official of a prominent eastern steam road recently asserted that the electric roads take away about 65 per cent of the local business, but in a year or two new through business, more profitable than that lost, comes to the steam railway through the aid of its competitor. Three of the officials of steam railways, replying to questions of the bureau of the census, take somewhat the same position. One says, "I myself do not view competition as being detrimental to the interests of this company. Am of the opinion that interurban lines, as a whole, will finally work out to the good of the public and induce long distance travel by people who have heretofore been indifferent to things that were not purely local." This official, however, does not claim that the benefit mentioned has been as yet definitely experienced.

A majority of the replies from officers of the steam lines, however, deny that there has been an increase in long distance travel as a result of the electric railways, and several assert that they expect still more serious injury in the future from the increase in the number and length of electric lines and the improvement of their facilities. The consensus of opinion seems to be distinctly hostile to the electric railways. Doubtless the time has been too short to enable steam railway officials to reach final conclusions on this subject, and it is perhaps natural that they should at first be more suspicious and hostile than the ultimate effects of electric competition would justify.

The policy of steam railways with regard to meeting electric competition varies greatly and is much affected by the local conditions. Five of the fourteen replies above referred to state that local fares have been reduced, at least in some cases, but six assert definitely that this has not been done. Another company says that because of the other advantages possessed by electric railways the loss of business can not be overcome by lowering the fares on the steam railways. This appears to be the general view of steam railway men. Two of the companies report that they have been forced to reduce the number of local trains on account of inability to compete with electric lines. One company, on the other hand, apparently as a competitive measure, has increased to some extent its local train service.

As an illustration of a policy which is probably pursued by a considerable number of companies, the following more extended quotation from the reply of a prominent traffic official may be given:

"It has been the policy of this company not to meet trolley competition by a reduction in rates, for the reason that this action on one division of our system would create jealousy on the part of people living in other suburban territory, and is likely to result in similar reductions on all branches in suburban districts.

"Our experience has taught us that the electric railway, in being able to take the passenger from his house direct to his office at a nominal rate, eventually gets enough of the steam line's traffic to eat up all its profit and it can not be covered by any reduction in rates. We have therefore followed the method employed by [certain other lines], viz., to take off stops at nearby points most affected by trolley competition, thus giving patrons at stations farther away from the terminal quicker and better service, and wait for the overflow travel served by the trolley lines in the outlying districts, which seeks the railroads in bad weather and eventually increases to some extent its aggregate of business.

"The open trolley cars in warm weather are particularly attractive to the suburbanite, as is shown by a comparison of the earnings of our . . . . branch during the month of August as compared with November, aggregating about $5,590 in the former and $11,700 in the latter."

The suggestion in this letter that the reduction of certain kinds of suburban service on the steam railways permits improvements in other parts of the service, is one which has been brought out at various times by other representatives of the steam railways. Some few have gone so far as to hold that the benefit resulting from the reduction of the local service was greater than the injury suffered. A writer in a prominent railway journal has even claimed that suburban service is usually unprofitable to the steam railways and that it interferes very seriously with their through traffic. Evidently what would hold true of some railways would not hold true of others. Some companies have derived a large part of their revenue from local passenger traffic, and have built branches primarily to accommodate such traffic. It is probably a fair conclusion from experience that a main line may gain traffic by being paralleled by an electric railway, but that a branch line is almost sure to lose.

Two or three of the important steam railways which have been most affected by electric competition have sought to meet it by themselves introducing electric service between certain points. As far back as 1895, the New York, New Haven and Hartford railroad company equipped its Nantasket Beach system with electricity, and later three other branch lines were so equipped. The most important of these branches is that between Providence and Fall River. The fare between these points was reduced from fifty to twenty cents, and the frequency of service greatly increased. More recently, the Boston and Maine railroad has built an electric line for heavy service between Concord and Manchester, N. H., and it also controls an electric system in Maine. The Pennsylvania company has an electric system along the seashore in southern New Jersey. The Long Island railroad has a stretch of track along the seashore which it has equipped with overhead trolley wires. Local electric cars and steam trains covering longer journeys operate over the same track. Such a combination has at the present stage of development many advantages, but the conditions of traffic are not always adapted to it.

In several instances electric traction has been applied to entire railways which were formerly operated by steam, or has been combined with steam traction on new lines. In most such cases, freight traffic is hauled by steam locomotives. Among railways of this type are the Cincinnati, Georgetown and Portsmouth, the new line between Bellaire and Zanesville, Ohio, the Peoria and Pekin Terminal railway, and the Waterloo and Cedar Falls railway (Iowa).

In two or three instances, steam railways have permitted separate companies to equip a part of their tracks with electricity for the handling of local traffic. Such an arrangement exists on the line of the Northern Pacific railway between Everett and Snohomish, Washington.

It is very probable that steam railways will, to an increasing extent, equip existing tracks with electricity for the hauling of a part or all of their traffic, or will build new electric lines at least for suburban passenger service. While the main purpose of the New York Central and Pennsylvania railways in introducing electric traction at their New York termini is to promote safety in the tunnels, they will gain also in the greater attractiveness, frequency, and cheapness of the suburban service which they furnish. In the case of the New York Central, at least, suburban trains will be operated to their destination by electricity. Two serious difficulties are, however, encountered by steam railways in attempting to use electricity for suburban trains. In the first place, it is hard to carry the electric current through the complicated switch tracks in the terminal yards. In the second place, if trains are run often enough to compete with those of the purely electric railways, they are likely to interfere with through passenger and freight trains. Indeed, the suburban service of a large city, whether conducted by steam or electricity, can be made thoroughly satisfactory only where it uses its own tracks, completely separated from the tracks devoted to through traffic.

This last consideration also bears on the question of the general future development of electric railways. It is not likely that interurban electric lines of the present type, even though they may be extended into long systems, can handle satisfactorily and on a large scale both local and through passenger and freight business. Even if single tracks be replaced by double tracks there is apt to be great interference between these different classes of traffic as soon as the aggregate business becomes heavy. The advantage of the local service of the interurban lines consists in its frequency and its numerous stops. Local cars are very likely, therefore, to get in the way of fast through trains; while on the other hand the slower through freight trains will tend to impede the local passenger cars. It has been suggested that freight trains might be broken up into separate units. This would largely do away with the necessity of switching, which is one of the chief causes of the delay in handling steam railway freight, and would thus increase the speed of through freight service. But to do this would so greatly multiply the number of moving units on lines with an extensive business that a single track could not possibly accommodate all the traffic in one direction.

These same considerations also cast doubt upon the possibility of so revolutionizing the working of the more important of the present steam railways, by the partial or complete introduction of electric power, as to enable them to perform both their present functions and the added functions of the interurban lines. Wherever traffic is very dense two distinct railway systems seem desirable—one for local traffic, both passenger and freight, and the other for through traffic. Both of these systems may ultimately be operated by electricity. Both kinds of railways in a given section may finally fall under the same ownership. Co-operation between them would afford many conveniences and economies. But the public will gain if these two conflicting kinds of traffic are handled on separate tracks. Where, however, the aggregate traffic is comparatively light, much would doubtless be gained if the present steam railways, following the example of the interurban railways, would increase the frequency and convenience of their local freight and passenger service by the use of single cars operated by electricity on their existing tracks.

PAST, PRESENT AND FUTURE OF ELECTRIC TRACTION.

BY FRANK J. SPRAGUE.

[Frank Julian Sprague, electrical engineer, inventor and consulting engineer for the New York Central and Hudson River railroad; he was born July 25, 1857, at Milford, Conn.; in 1878 he was graduated from the United States naval academy, and entered the naval service; four years later he was chosen a member of the Crystal Palace exposition and the following year he resigned from the naval service, founding in 1884 the Sprague electric railway and motor company; in the modern electric railway he is pioneer; he introduced the high speed electric elevated and inaugurated the multiple-unit system of electric railways; he is consulting engineer for the New York Central and Hudson River railroad, also for the Sprague Electric company and for the General Electric company.]

Copyright 1904 by McGraw Publishing Company

In 1874, although a quarter of a century had passed since Farmer and Page had carried on their experiments with small model electric railways, there was not in existence a single car operated by electricity. Five years later Edison had in his development of the incandescent light created the low resistance dynamo, and established the multiple arc system of distribution, but even after eight years more elapsed there were less than a dozen electric railways the world over, scarcely any two alike, and none typical of the modern development, to mark the work in this line of such pioneers as Siemens, Henry, Edison, Van Depoele, Reckensaun, Daft, Field, Bentley, Knight and others. Perhaps the time was not ripe, and it needed a special combination of opportunity and willingness to assume great commercial risks, as well as a departure in practice profiting by the mistakes of earlier work, to start that industrial progress which has been so astounding. Such an opportunity occurred at St. Joseph, Mo., and more especially at Richmond, Va., in 1887, when, under the auspices of the Sprague Electric Railway & Motor company, which had been largely fathered by Edward H. Johnson, and adopting a principle of motor construction and suspension tested by me on the New York elevated railroad the year before, the active commercial development of the electric railway began.

The vicissitudes of the Richmond road have passed into history, its apparatus into honored and well-earned rest, but the principles underlying its construction and operation have survived, and to-day mostly dominate all electric traction, for there were used the multiple system of distribution at constant potential of 400 to 500 volts, the single overhead trolley with parallel main conductor and feeders, the ground return with bonded and reinforced rails, the universal movement underrunning trolley carried in the center of the car, double motor equipments under the car, centered on the axles, geared to them and flexibly supported at the free end, fixed brushes for both directions of movement, variation of current and torque by variation of field resistance and turns, dual control of motors, and series and parallel operation. While novel, all these features were not original with Richmond. Edison and others had used constant potential, Van Depoele form of underrunning trolley. I had proposed a rigid overhead conductor with flexible overhead contact for the Metropolitan railway in London, in 1882; and Reckensaun had put into operation series parallel control. But many features were distinctly new there or in the preliminary experiments of the Sprague company, and at Richmond there was the combination of various ideas old and new on a scale commensurate to achieve results.

While that work was in progress the Van Depoele company was offered me by Mr. W. J. Clark, whose commercial sagacity and effective work in the development of electric traction has been so many times exemplified, and on my failure to take it up (I could not) it fell to the Thomson-Houston company and Mr. Coffin. Aided in a great measure by Van Depoele's happy adoption of the carbon brush, and with unusual business energy, the Thomson-Houston company rapidly developed. The resulting rivalry and warfare between it and the Sprague company, although not unattended by some disastrous results, on the whole was of ultimate great benefit to the art because of the rapid development of apparatus and the extension of electric traction. In 1890 came the absorption of the Sprague company by the Edison General Electric, with which it was allied by financial and manufacturing interests, and later the union of it with the Thomson-Houston in the General Electric company.

At Richmond, it should be noted, began the contest between the electric railway and the telephone interests because of the common use of earth and rail returns, with resulting injurious effects on the weaker and more delicate apparatus. This was waged in not less than sixteen states of the union, with the practical result of the adoption of complete metallic circuits for the telephone system—a result the necessity of which was already beginning to be apparent, and which was later emphasized by the growth of long distance telephone service, quite independent of the influence of electric railways, who were not the sole disturbers of peace—and potential.

A decade passed, and the trolley hummed its song of victory and emancipation while weaving its threads in every civilized country. Horse, mule, cable and prejudice disappeared, towns grew into cities, farms became suburbs, homes grew up in the place of tenements, time and money were saved, the health and morale of employees were improved, great works were created, and an army of men were employed. Companies were consolidated into great systems, as under the initiative of Henry W. Whitney on the west end of Boston, and hundreds of millions of capital were invested.

But with it all the trolley remained essentially an individual system, the movement of single cars along highways, picking up and leaving passengers wherever desired, its use largely determined by convenience, capacity and economy under such conditions, save in a few instances of limited train movement where the power was consolidated in a single car at the head of a train, a kind of equipment in fact on which work was progressed as early as 1885. The steam railway field on its own exclusive right of way was practically uninvaded, although as early as 1892–3 the construction of a locomotive for experimental work for Henry Villard had been undertaken by Drs. Louis Duncan, Cary T. Hutchinson and myself; and the General Electric company had actually undertaken the contract for operating the trains through the Baltimore tunnel. But conditions where electricity could be applied on such a scale were limited.

In 1897, however, just ten years after the Richmond beginning, an opportunity again arose for a development which may also be fairly termed epochal. For a dozen years the Manhattan Elevated railway company had been the objective point for electric enthusiasts, and for nearly two years I had endeavored unsuccessfully to get an opportunity to make a demonstration there at my own expense of a new system which was the outcome of the electric control of elevators. The proposed equipment of the south side road of Chicago, under the technical advice of Sargent and Lundy, the latter of whom had been with me in the early work, afforded the opportunity I sought, with the result that the "multiple unit" system was contracted for, and before the end of the year tested at Schenectady and Chicago.

This system did not consist simply of a method for single control of motors on different cars of a train, for that had been proposed many years before by others as well as myself, but for grouping into a train two or more motor cars, each equipped with motors and controllers for those motors, with provision for simultaneous control from master switches of all the main controllers through the medium of an independent electric train line common to all the cars, connected on the one hand to the master switches, and on the other to the operative parts of the controllers of the equipped cars. The connections from car to car were made by jumpers, and the main current for each car was taken by collectors on that car. The train connections were such that cars could be made up into any desired aggregation, without regard to number, order or relative relations. As originally planned (and the original equipment is still in operation) the main controller was of the cylinder form, with pilot motor drive. Stepped or automatic advance under current limitation on each controller was obtained by relays operated from the train line. Since then the multiple unit idea has grown and spread until it is now almost universally adopted for all heavy work. Many variations in detail have been made from time to time by different inventors, such as operating the cylinder by air pistons or magnets instead of by a pilot motor, or breaking up the controller into several parts, each operated by a magnet or air piston, with or without automatic control, or with the automatic feature limited to the master switch. But the essential principle—the electric control of the controllers from master switches through an independent line—has never been, and is not likely to be, departed from.

From combining and operating car units equipped with motors aggregating a capacity of 100 h.p., for passenger service only, the practice has now developed until it is applied to the heaviest locomotive operation. The 2,200 h.p. units which are to form a part of the New York Central railroad equipment will be so operated, giving at times a possible aggregate of nearly 7,000 h.p. under single control. It is here in New York that two of the greatest improvements are now being carried out which will have a marked, although perhaps specialized influence on electric traction. I refer of course, to the great work of the Pennsylvania railroad company, and the even more extensive electric undertaking of the New York Central—the latter of which is actively pushing, in connection with its terminal changes, the electrical equipment of its regular main and suburban service for nearly forty miles out from its city terminal, where the heaviest trains will be operated at the maximum speed.

The plans adopted for this equipment, decided on by a commission of which vice president Wilgus is chairman, include the use of continuous current motors within the zone to be equipped, a decision of perhaps more than ordinary moment at a time when world wide experiments are being undertaken, and extraordinary claims made in behalf of alternating current motors; and one which warrants some comment both upon the special subject of such motors, and the electric operation of trunk lines in general.

The present is not the time for me to go into any detailed statement of the reasons which were conclusive for the commission's decision, but suffice it to say that I am entirely satisfied with it, and believe it was the only one which could have been safely reached at the present time. This is said without any spirit of antagonism to the alternating current motor development, and without abating any jot of confidence in or hope for its future. Certain statements, however, I think, can now be safely hazarded: One, that the polyphase motor will not secure any lasting foothold in railway operation; another, that the continuous current motor will not for a long time outlive its usefulness; and finally, that through trunk line electric service as such is not of the immediate future.

Machine for machine, the commutatorless motor, coupled with the ability to economically transmit electricity at high pressure for a great distance, and transform with stationary apparatus to any desired pressure, has been matched against the limitations of the commutated motor and restricted distribution for the fifteen years since Ferraris and Tesla first advocated its use. Polyphase transmission has become a most influential factor in long distance transmission, and the polyphase motor finds a wide and increasing field of usefulness; but the continuous current motor still performs its service placidly, and demonstrates its utility, while throughout the United States there is not a single polyphase railway, and in Europe there are but a few introduced, chiefly by a single company of great technical ability.

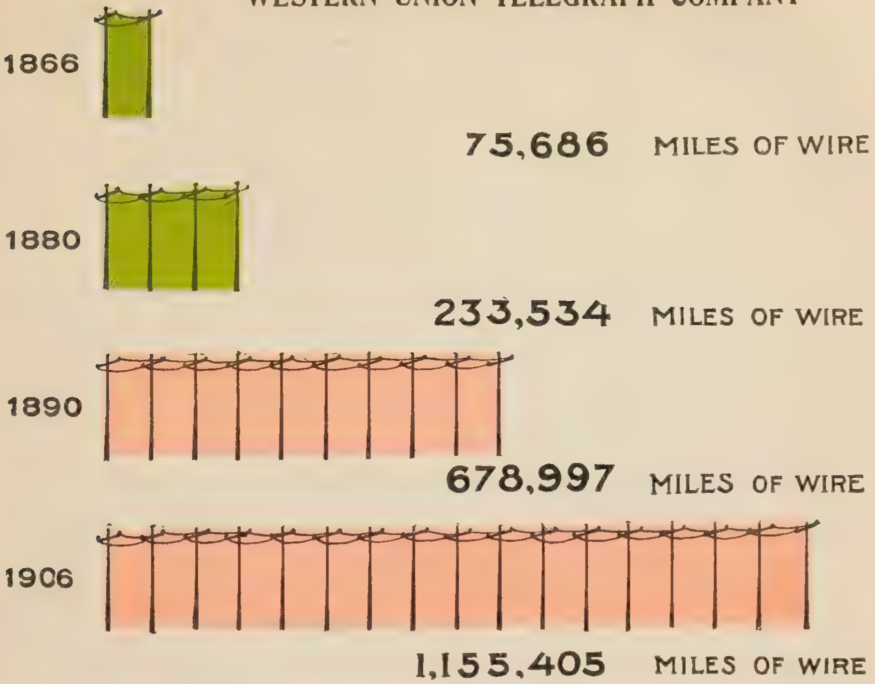
Within the past year, however, undoubtedly spurred on by Mr. Bion J. Arnold's predictions and pioneer work, the leading companies in this country have taken up the subject vigorously, and made material progress in the construction of single phase alternating current motors, while similar developments are taking place abroad. Probably in no phase of the electrical development has there been greater concentration of high technical skill and mathematical ability than in this new departure by such men as Steinmetz, Lamme, Finzi and others. The methods and results vary materially, but one significant fact is patent in all—the much despised commutator has reappeared, and under conditions some not as favorable as exist in the continuous current motor.

In all alternating current motors there must be a reduction of armature potential if high potential transmission on the trolley exists, either by short circuiting a closed armature with independent circuits in a field supplied direct by high potential, as in Prof. Elihu Thomson's repulsion motor or by transformation of the whole or part of the current energy, as in the Lamme and other motors. In some cases even a greater number of brushes is used than in continuous current practice. At present the older type of motor apparently has some advantage in the matter of weight, individual efficiency and freedom from sparking, and I think will maintain it. Undoubtedly, however, the future holds out much promise for the single phase motor, and it will be a satisfactory machine. It is well, however, to ask wherein lies the demand for it, and why does it threaten the supremacy of its rival? There are two special reasons remaining, that one on which much stress was laid, the absence of commutator, no longer effective. These are the possibilities of use of a fairly high potential on the trolley or secondary system of distribution, with resultant increase of distance between the substations and better averaging of load on them, both very important features, and the abolition of the rotary converter, a desirable result. But as to the first there is a chance for error of judgment, for the possibilities of the direct current motor are by no means exhausted, and for any given maximum potential and track rail specific resistance continuous current admits of the less size of conductor.

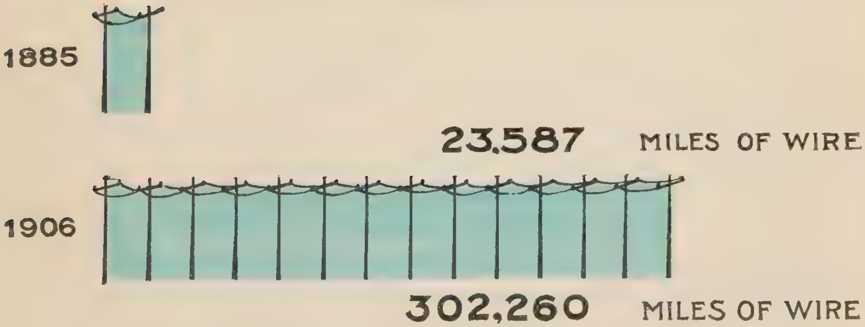
In the matter of initial transmission to substations, the advantages of high potential are common to any system of motors. At these points the pressure must be transformed down, the energy being then delivered through rotaries or motor dynamo sets for continuous current or direct for alternating current to the secondary supply system. Up to the present it has been the general practice to limit direct current work to about 600 volts, partly for construction reasons and partly because of the existing practice on city systems, or at terminals, while the alternating current is proposed for about 3,000 volts. I except here, of course, such as the Zossen experiments, which both in the matter of trolley potential and speed are chiefly interesting as illustrating what extremes are both commercially impracticable and useless.

MILEAGE OF WIRES OF TELEGRAPH AND TELEPHONE COMPANIES

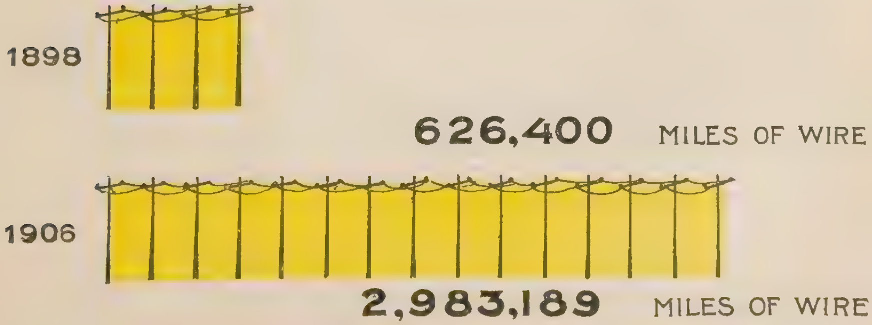
WESTERN UNION TELEGRAPH COMPANY



POSTAL TELEGRAPH CABLE COMPANY



AMERICAN TELEPHONE AND TELEGRAPH COMPANY



Speaking generally, it would appear at first sight that with the same size of conductors and less increase of pressure would mean a much greater ratio of increase of distance between substations. Since, however, the load on the secondary circuit would increase about as the distance between the substations, and the capacity of the secondary circuit would probably be considerably less than that of the ordinary third rail because of the necessity of carrying smaller conductors over the cars, even if such conductors are reinforced, as would be most advisable, by a main conductor extending along the tracks and supplying the trolley wires parallel to it, the distance between the substations would be materially reduced, and in fact would generally be considerably less than that represented by the simple ratio of the increase of potential.

While direct current motors may be always somewhat at a disadvantage in the matter of individual potential, when there is a plurality of motors, as in a large locomotive, it is quite possible on a direct current system to work up to 1,700 or even to 2,000 volts on a single trolley line, maintaining a maximum, as in regular use on the Berlin Elevated, of from 850 to 1,000 on individual motors; and if a three-wire system be used it is quite possible to make use of a maximum trolley potential of nearly 4,000 volts. I am not prepared to say yet that this is advisable, but it is possible, and I submit that in the problems involved in any trunk line development there are many questions of greater importance than that of the relative allowable trolley potentials for direct and alternating current equipments.

The very essence of successful electric railway operation has been to supply from a single source of power a large number of moderate powered and well-distributed units. Trunk line service is of quite a different character, and many of its present features must be changed, or its density of traffic greatly increased before investment necessary for electric operation can be generally considered. It may be accepted as a cardinal principle that no large railway system will generally adopt electricity as a motor power unless it be dictated by the assurance of less cost of operation or a greater return on existing and new investment, and such adoption will not take place until the average density of traffic will warrant the operation on a section measured by the practical limits of transmission from a single station at which time the joining together of sections will become possible. Infrequent and spasmodic service in large units over long distance offers little chance for electric operation. The early application to the large locomotive units will be in such zones of electrical operation, like the New York Central, where the pressing use of electric suburban service and other special requirements exist, in which cases all equipments should be electrically operated. Such cases are, however; specific, and are not yet necessarily favorably conclusive on existing trunk line propositions. On this subject I see no reason to change my views as expressed at length many times during the past fifteen years.

THE NEW YORK SUBWAYS.

BY JAMES CREELMAN.

[James Creelman, journalist; he was born Nov. 12, 1859, at Montreal, Canada, and received his education at the public schools of Canada and in Talmadge's Lay college; in 1887 he connected himself with the New York Herald as reporter, as correspondent and as editorial writer, in 1890 being editor of the London edition of the paper, and the following year of the Paris edition; during the Japanese war of 1894 he was war correspondent for the New York World, and in 1897, during the Græco-Turkish war, for the New York Journal; also during the Cuban war of 1898 and the Philippine war in 1899, when he captured a Spanish flag, was shot and almost fatally injured; he is now on the staff of the New York World; among the notables whom he has interviewed are Leo XIII., King George of Greece, President Faure, H. M. Stanley, Count Tolstoi, Louis Kossuth, the emperor of Corea and Prince Bismarck; he is the author of On the Great Highway.]

To appreciate the magnitude of the work done in the construction of New York's new subway railway it must be remembered that in the old Roman days it took 30,000 men eleven years to make a tunnel three and a half miles long, while American skill and energy, with less than 12,000 men, including engineers, in four years constructed a tunnel equal in capacity to more than fifty miles of that of Rome, in addition to ten miles of viaducts—all in the streets of a closely built city crowded with complicated underground barriers.

The opening of this rapid transit system to the public marked the first accomplished stage in a vast transportation plan which must soon transform New York into a city unique among the great municipalities of the earth.

Its twenty two miles of underground tracks, viaducts, and elevated structures and its tunnel to Brooklyn and extensions beyond, with express trains running sometimes a mile a minute, are intended to carry something like 200,000,000 passengers a year, in addition to the more than 700,000,000 passengers moved annually by the Metropolitan street railway system and the Manhattan elevated railways.

Across this mighty system of north and south travel the Pennsylvania railway company will lay its $50,000,000 private tunnel under the Hudson river, under the city at Thirty third street, and under the East river, so that the crowded population of the second city of the world may move out into the vacant spaces of Long Island and New Jersey as well as into the Bronx and Westchester county.

The city has not spent a dollar in the construction of the new rapid transit system, although it has loaned the contracting company $37,000,000, which is to be repaid with interest in fifty years. The Pennsylvania railway company will spend $50,000,000 of its own money in its separate transverse tunnels and terminals.

New York owns the rapid transit tunnels, viaducts and elevated structures, which have been leased to the contracting Interborough Rapid Transit company for fifty years, with a right of renewal for twenty five years.

Besides, the Metropolitan surface railway interests expect to soon begin the construction of two rapid transit tunnels from the lower point of the city to Fifty ninth street—one on the east side and the other on the west side—with free transfers to the surface cars throughout the Metropolitan system; and it is said that this development will create conditions powerful enough to force all the transportation lines, elevated, surface, and underground, under one management and control.

The construction of the new rapid transit system has not only solved the most complex and exasperating underground engineering problem ever planned—the blasting and digging of 3,000,000 yards of rock and earth and the explosion of 900,000 pounds of dynamite in the streets of a crowded city—but it inaugurates in the American metropolis a vast experiment in the public ownership of public utilities, which is expected to profoundly influence the attitude of the American people toward similar franchises in the future.

The transportation problem in New York is unlike that of any other community in the world. The island of Manhattan is a rocky finger stretching southward into New York bay—between two wide rivers. As the population increased, land in the lower part of the island, where the important business centers lay, became enormously valuable. The city could not extend southward, save to Staten island, and the existence of the Hudson and East rivers limited its growth eastward into Brooklyn or westward into New Jersey, for the average New Yorker showed a vigorous dislike of ferries.

The city grew northward, crossed the Harlem river and spread out in the Bronx district.

The old stages had disappeared; the horse car lines disconnected and bearing no intelligent relations to each other, began to unite; the one legged and experimental Gilbert elevated railway was followed by the elevated railways that now form the Manhattan system.

As the upper districts of the city were built up the price of land increased and people of moderate means were compelled to move out still further.

The narrow topography of the water bounded island offered only a few avenues for this north and south travel, which increased by leaps and bounds. The journey in a horse car to Harlem from downtown was too slow to be endured, and the elevated railways were packed to their utmost capacity in hours when the great mass of the traveling public moved to and from their places of business.

Then came the consolidation of all the horse car lines into a single system and the introduction first of cables and then of electricity as the motive power. That stupendous work, conceived and executed by William C. Whitney and Thomas F. Ryan, proved to be inadequate to the rapidly growing needs of New York.

There were enormous profits in this business and capitalists eagerly sought for opportunities to invest. But there was no more room available on the surface of the streets and public opinion was passionately opposed to the erection of any more noisy and ugly elevated railway structures.

With a swiftly growing population and insufficient means of travel the city cried louder and louder for a solution of the problem. The East river bridge had furnished an outlet to Brooklyn, and other bridges, as well as tunnels, were discussed. There was talk of a bridge across the Hudson river and a tunnel under it. But the main problem was rapid transit up and down the few avenues of Manhattan Island.

A new factor in the growth of New York made conditions all the harder to bear. With the general advent of tall steel buildings the crowd in the downtown business districts increased. The solid rock foundation of the city made it possible to erect structures of twenty stories and more. One city was built on top of the other. A four or five story business building occupied by five or six hundred persons was replaced by a tall structure sheltering two or three thousand persons.

So that if New York was unique in its length and narrowness it was also singular in being practically an unbroken ridge of rock upon which three or four layers of population could live where one had lived before.

Although the masses in the business districts at the narrow end of the island grew denser and the area of cheap homes spread out more and more in the Bronx district, the north and south streets of the city could not be increased. Besides there had to be room left for wagon traffic.

This swift revolution in the conditions of life in New York, compelled public action on plans which had been loosely and spasmodically agitated since 1860, when the first suggestion for a rapid transit tunnel was made. Already men of affairs like Abram S. Hewitt, Alexander E. Orr, John H. Starin and William Steinway were pressing the matter on the mind of the public. In 1868 Alfred E. Beach had secured a charter and built a tunnel 350 feet long under Broadway near the city hall, but capital was shy, and the great tunnel enterprise suggested by the experiment was abandoned. But the idea lived.

In 1888 Mayor Hewitt laid before the board of aldermen a plan for rapid transit out of which the present subway system grew. His ideas were embodied in a bill, which failed to pass the legislature. But the scandalous crowding of the surface and elevated trains, the sharp outcry of the suffering public and the obvious fact that the continued increase of population would soon make travel in New York intolerable compelled the legislature to act. In 1891 there was enacted a law authorizing the construction of a rapid transit system by private capital and providing for a rapid transit commission. The plan failed. Capital could not be interested.

A rich New Yorker offered, through the chamber of commerce, to carry out the enterprise if the city would lend him $30,000,000. That proposal struck fire. Mr. Hewitt and his associates declared that if the city must lend its credit to build the rapid transit system the city should own it.

The idea of government ownership was popular. Besides, it was seen that such a plan could be carried out on lines dictated by public policy free from the influence of private capital.

As a matter of fact, the new subway is the first system of transportation provided for New York conceived entirely in the public interest and free from the marks of personal scheming or corruption. Neither August Belmont nor any other of the men who built or will operate the subway road had anything to do with the laws which created it.

The chamber of commerce promptly named a committee which, under Mr. Hewitt's leadership, drafted a bill providing for a subway system to be constructed and operated by the lowest bidder, the money for the work to be raised by a city bond issue and repaid with interest by the contractor, the road to be owned by the city at the expiration of the contract. After a bitter struggle the bill was passed May 22, 1894.

Then followed the serious work of laying out a route and planning the size and character of the tunnels and viaducts. The rapid transit commission, with Alexander E. Orr as its president and Mr. Parsons as its chief engineer, studied every known system of underground city transportation in the world. In six years a plan was adopted, and on Jan. 15, 1900, the commission opened the bids.

In spite of the splendid franchise involved there were only two bidders. Andrew Onderdonk's bid was $39,000,000. John B. McDonald's bid was $35,000,000. Mr. McDonald got the contract.

Mr. McDonald had only $500,000 of his own when he undertook the $35,000,000 enterprise, knowing that he must furnish a construction bond of $5,000,000 and raise at least $15,000,000 to furnish the road with engines, rolling stock and other equipment.

The whole city looked on and wondered how the contractor could get enough capital to carry out his obligations in the teeth of the fact that the leading capitalists had refused to touch the scheme. He was known to be a man of wonderful energy and great experience. It was he who had built the almost impossible tunnel under Baltimore. But the difficulty of blasting and digging more than 3,000,000 yards of rock and earth from the streets of crowded New York, the interminable lawsuits to follow damages to buildings, the terrible construction problems presented by miles and miles of sewers, water pipes, steam pipes, gas pipes and electric and other conduits—these things made Mr. McDonald's bid seem like madness to many of his friends.

Yet, extraordinary as it may appear, Mr. McDonald's original private estimate of the cost of the four years' work came within $100,000 of the actual cost.

The contract provided that Mr. McDonald should construct the subway road in four years at a cost of $35,000,000; that he should have the right to operate it for fifty years, with a right of renewal for twenty five years; that the city would furnish him with $35,000,000 by an issue of bonds bearing 3½ per cent interest, and that in fifty years he should repay the $35,000,000 and interest by annual instalments. The entire property would belong to the city, and at the end of the lease the city could release the system on its own terms to whom it pleased. The contractor was to make his profit out of the construction and operation of the road.

It was provided that a single fare of five cents should be charged for passage from one end of the road to the other except in the case of parlor cars, but, if parlor cars with an extra fare should be used, there must not be more than one such car to each train.

There were to be four tracks. Local trains were to make an average speed, including stops, of not less than fourteen miles an hour, and express trains were to make an average speed of not less than thirty miles an hour.

Mr. McDonald had a hard time of it at first. He went to Mr. Whitney and Mr. Ryan, the financiers and masters of the vast Metropolitan surface railway interests. They had no confidence in the subway as a commercial proposition and refused to touch it. He went to other financiers in vain. He was ridiculed. The newspapers printed stories about his embarrassing plight. But he set his teeth and continued his effort to secure financial backing.

It was August Belmont who finally came to Mr. McDonald's rescue. He organized a corporation, with a capital of $6,000,000—subsequently incorporated as the Rapid Transit Subway Construction company—for the construction of the road. The Rapid Transit Construction company furnished $4,000,000 of Mr. McDonald's $5,000,000 bond to the city, and the remaining $1,000,000 was provided by four security companies.

Two years later the Interborough Rapid Transit company took over all the rights and obligations of Mr. McDonald and the construction company, and it is to this corporation—which also controls the Manhattan elevated railways—that the public must look for the operation of the new subway system of rapid transit.

Now came the physical upheaval and the struggle with subterranean problems which New Yorkers will not soon forget. The contract for the road was sublet to fifteen contractors, each having a section. On March 24, 1900, Mayor Van Wyck turned the first spadeful of earth in the presence of a multitude. Then the streets were torn up from one end of the city to the other.

And while the public was in the first agony of the disturbance, another contract, to extend the road to the Battery under the East river by a tunnel to Brooklyn and thence to the Flatbush avenue entrance of Prospect park, was given to Mr. Belmont's company.

No constructor had ever before been confronted with such a complicated problem. It was like a great surgical operation. A vast network of pipes and wires lay under the streets in the way of the diggers and blasters. Huge sewers and water mains, gas and steam pipes, twisted and tangled leaden cables—rusted and mouldy channels of power and light and health—through this buried and to some extent uncharted underworld stretched the route of the new tunnel.

The task of finding a way through the underground labyrinth, without interrupting or destroying its thousands of intersecting pipes or conduits staggered the engineers and their assistants. While they blasted out miles of rock with dynamite along the old and new foundations of city houses, they had to wrap, support and protect the bewildering network overhead.

It was this battle with underground pipes and cables, not the mere tunnelling, that made the sections of a few hundred feet last for years, while the public cursed the open trenches and mountains of earth and rock.

The subway road is, roughly speaking, V-shaped. It starts at the city hall, where there is a big loop under the park, and passes through the station at the end of the Brooklyn bridge.

From this point the tunnel with its four tracks goes through Center, Elm and Marion streets and Lafayette place to Astor place, where with a slight curve, it goes under Fourth avenue and Park avenue to Forty-second street. Here it turns westward through Forty-second street to Broadway and up Broadway to One Hundred and Third street. This is the end of the main line. The four track road at this point divides into two tunnels, each containing two tracks. The west side tunnel continues up Broadway to One Hundred and Seventy-first street, turns into Eleventh avenue, and follows it to Hillside avenue. At this point the trains emerge from the tunnel and run on a viaduct through Eleventh avenue, then over to Nagle avenue, through Amsterdam avenue, over the Kingsbridge road into Two Hundred and Thirtieth street and Bailey avenue, the end being at Spuyten Duyvil.

The east side branch, which forks off from the main line at One Hundred and Third street, turns eastward under One Hundred and Fourth to Central Park west, under the northwest corner of Central Park to Lenox avenue, up Lenox avenue to One Hundred and Thirty-fifth street, then under the Harlem river, through a tunnel, which has become famous for the engineering skill required to construct it, straight on to Third avenue and One Hundred and Forty-ninth street, where the tunnel ends and the trains run upon a viaduct to the entrance of Bronx park.

New York has anathematized the builders of this great system for four years of physical distress. Yet disinterested engineers who watched the progress of the work, the confounding difficulties of the deep cut at Forty-second street, the complications of the situation in Park avenue, the appalling problems of the passage under the Harlem river, now declare that the completed structure is a monument to the courage, intelligence and honesty of the men who made it.

This is not like other tunnels that the world has seen, damp and dark and ugly, but wide and light and well ventilated—an arcade rather than a tunnel, with handsome, convenient stations and a marvellously complete system of signals to avoid accident. It has 800 copper-sheathed and practically fireproof cars, working on the third rail system, with one electric power house, between West Fifty-eighth and Fifty-ninth streets, more than twice as large as Madison Square Garden, with a capacity of something like 100,000 horse power.

To make way for this magnificent system of transportation, every inch of which was planned by the city's own rapid transit engineers and built according to contract, hundreds of buildings had to be held in safety by costly props against their foundation walls. To do the work without seriously interrupting the travel of the city was the problem which stared the contractors in the face night and day. The subway cost more than $1,000,000 a mile, at least fifty times as much as an ordinary railway would cost. And the extraordinary thing is that, but for one last labor strike, it would have been finished and turned over to the operating company, with the trains on the tracks ready for operation, a full month before the time set in the contract.

It is now recognized that the future development of rapid transit in New York must be underground. With a solid rock foundation, convertible into dry and stable tunnels, and capable of supporting buildings of any height, it is demonstrable that the American metropolis can accommodate a denser population than any other city in the world.

EARLY DAYS OF THE FIRST TELEGRAPH LINE.

BY STEPHEN VAIL.

[Stephen Vail, son of the co-inventor with S. F. B. Morse of the electric telegraph; born in Philadelphia and educated at the Morristown academy and Nazareth hall; he has devoted his life largely to the effort to secure recognition of his father's claims to equal share with Morse in the invention of the telegraph and with this purpose has contributed several articles to magazines, among them this from the New England Magazine.]

Could Columbus have "wired" to Ferdinand and Isabella the news of his great discovery on October 12, 1492, he would have anticipated by considerably less than four short centuries of time the actual period when, across the bed of the broad Atlantic, were laid the wires, by means of which instantaneous communication between the shores of the land he discovered and that from which he had sailed, became a fact.

The citizen of this or any other country would feel much deprivation could he not read the morning or evening newspaper filled with the recital of events which had taken place the same day in all parts of the globe; and he receives, with a calm indifference to the mighty changes in the conditions of life it involves, the reply to his telegram, sent but an hour before to the Pacific slope, or to the still more distant capital in Europe. Over mountains, across rivers, and along the ocean cable, resting so calmly on the bottom of the sea, has flashed his message, and later its response. Perhaps he has grown annoyed that the response has not sooner reached him. "My message was sent from here two hours ago, and I ought to have received an answer ere this!"

Could he look back to the time, a short half century ago, when this now mighty agent in man's control was an infant, weak and struggling for existence, he would perhaps realize through that retrospect what gigantic strides have been made in the progress of mankind.

The citizen of New York reads in his morning paper a full account of the baseball game played the day before by the two American clubs at Sydney, New South Wales,—

17,127 miles distant! And how did this telegram reach New York ten years ago? From Sydney it was sent across the Australian continent, thence beneath the Pacific ocean to the Island of Java. From there it was transmitted to Singapore, thence under the waves of the Straits of Malacca, around the coast of the Malay peninsula to the Island of Penang, and from there 1,200 miles under the Indian ocean to Madras. From that city overland, 400 miles, to Bombay, and thence under the Arabian sea to Aden, a distance of 1,817 miles to Suez, 1,460 miles farther. Then it was flashed across the desert to Alexandria, a lonely journey of 150 miles, from whence it was passed under the Mediterranean sea to Malta, 1,000 miles away, thence to Gibraltar, 1,100 miles, still farther on its route. The operator there sent it 400 miles to Lisbon, from there it being sent to London, 1,000 miles distant, and then on to the Irish coast, where, at Waterville, it began its last run under water, 2,500 miles, to Canso, Nova Scotia; and then, making its last leap of 1,000 miles, it reached the city for which it had started! The time consumed in the journey from Sydney to New York was no greater than that ordinarily occupied in transmitting a telegram from New York to Chicago, with the additional loss of one minute at each of eighteen stations. The cost of each word of this dispatch was $2.58, and it involved the services of thirty four operators at different places along the route, and brought into requisition the wires of the telegraphic systems of the continents of Asia, Africa, North America, besides that of Australia,—the information being received in almost as short a time as if the game had been played in New York city.

But see the changes time works in ten years. Now the same message would have been sent from Sydney to Fanning island, on the wires of the Australian-Canadian cable, and from Fanning island to Vancouver, thence by land wires to New York.

Could the astonished citizens of Washington, D. C., when they read in the "extras" of the afternoon of May 1, 1844, the strange heading, "By Telegraph," and under it the printed news of that which had taken place in Baltimore (the distance of forty miles intervening) but half an hour before, and which they knew could not have reached the city by the usual means, the railroad—could these same astonished citizens have looked forward to this year of grace, and by some occult power have been enabled to see the telegram flashing through 17,000 miles of space in as short a time as was required to send that first message from Annapolis Junction, twenty two miles, to Washington, they would not have been so slow to realize the future of the then ridiculed invention and to lend their means to the speedy establishemnt of the telegraph upon a sound financial basis.

On November 28, 1837, Professor Morse addressed the Hon. Levi Woodbury, secretary of the treasury, the following communication:

. . . "In my letter to you, in answer to the circular respecting telegraphs, which you did me the honor to send me, I promised to advise you of the results of some experiments about to be tried with my electro-magnetic telegraph. I informed you that I had succeeded in marking permanently and intelligibly, at the distance of half a mile (!)

"Professor Gale, of our university, and Mr. Alfred Vail, of the Speedwell Iron Works, near Morristown, New Jersey, are now associated with me, in the scientific and mechanical parts of the invention. We have procured several miles of wire, and I am happy to announce to you that our success has thus far been complete. At a distance of five miles, with a common Cruikshank's battery of eighty seven plates (4 x 3½ inches, each plate), the marking was as perfect on the register, as in the first instance of half a mile. We have recently added five miles more, making in all ten miles, with the same result; and we have now no doubt of its effecting a similar result at any distance.

"I also stated to you, sir, that machinery was in progress of making, with which, so soon as it should be completed, I intend to proceed to Washington, to exhibit the powers of the invention before you and other members of the government. I had hoped to be in Washington before the session of congress, but I find the execution of new machinery is so uncertain in its time of completion, that I shall be delayed, probably, until the beginning of the year. I am anxious, of course, to show as perfect an instrument as possible, and would wish as much time for the purpose of perfecting it as can be allowed, without detriment to my interests, as an applicant of the attention of the government to the best place of a telegraph."

The committee of commerce, of the house of representatives, on the 6th of April, 1838, reported as follows:

"On the 3d of February, 1837, the house of representatives passed a resolution requesting the secretary of the treasury to report to the house, at its present session, upon the propriety of establishing a system of telegraphs in the United States. In pursuance of this request, the secretary of the treasury, at an early day, after the passage of said resolution, addressed a circular of inquiry to numerous scientific and practical individuals, in different parts of the union; and on the 6th of December last, reported the result of this proceeding to the house.

"This report of the secretary embodies many useful suggestions on the necessity and practicability of a system of telegraphic dispatches, both for the public and individual purposes; and the committee cannot doubt that the American public is fully prepared and even desirous that every requisite effort be made, on the part of congress, to consummate an object of so deep an interest to the purposes of government, in peace and in war, and to the enterprise of the age.

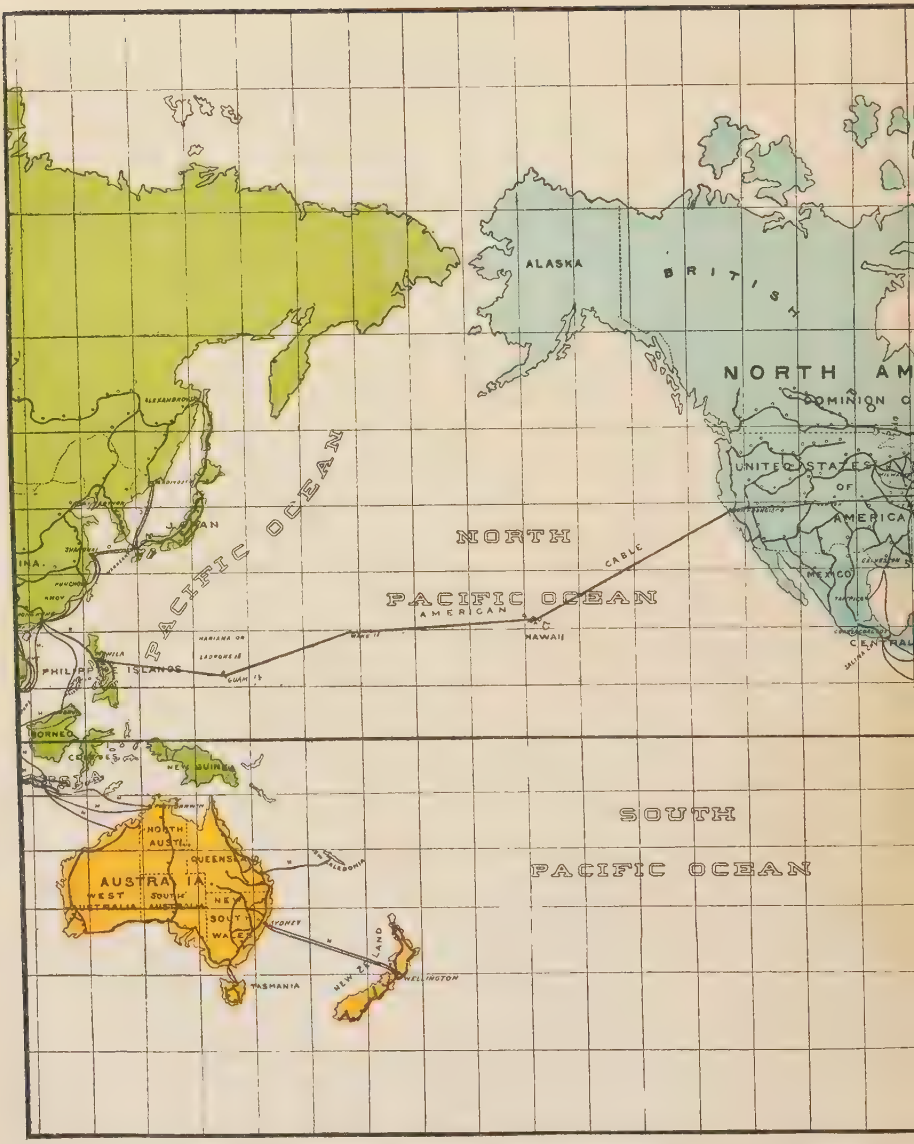
"Amid the suggestions thus elicited from various sources, and embodied in the before mentioned report of the secretary of the treasury, a plan for an electromagnetic telegraph, communicated by Professor Morse of the university of the city of New York, is pre-eminently interesting, and even wonderful. This invention consists in the application by mechanism of galvanic electricity to telegraph purposes, and is claimed by Professor Morse and his associates as original with them; and being so, in fact, as the committee believes, letters patent have been secured, under the authority of the United States, for the invention. It has, moreover, been subjected to the test of experiment upon a scale of ten miles distance by a select committee of the Franklin institute of the city of Philadelphia, and reported upon by that eminently high tribunal in the most favorable and confident terms.

"In additional confirmation of the merits of his proposed system of telegraphs, Professor Morse has exhibited it in operation (by a coil of metallic wire, measuring about ten miles in length, rendering the action equal to a telegraph of half that distance) to the committee on commerce of the house of representatives, to the president of the United States, and the several heads of departments, to members of congress generally, who have taken interest in the examination, and to a vast number of scientific and practical individuals from various parts of the Union; and all concur, it is believed, and without dissenting doubt in admiration of the ingenious and scientific character of the invention, and in the opinion that it is successfully adapted to the purposes of telegraphic despatches, and in a conviction of its great and incalculable practical importance and usefulness to the country, and ultimately to the world. . . . The probable outlay of our experiment upon a scale equal to fifty miles of telegraph, and equal to a circuit of double that distance, is estimated at $30,000. Two thirds of this expenditure will be for material, which, whether the experiment shall succeed or fail, will remain uninjured, and of very little diminished value below the price that will be paid for it."

Mr. Alfred Vail of Morristown, New Jersey, having become, while a student at the University of the City of New York, deeply interested in the experiments there being made by Professor Morse, entered into a partnership with him, for the purpose of developing the ideas of the latter, and to furnish money for that development; and to obtain a patent he began at the Speedwell iron works of his father, Judge Stephen Vail, one mile from Morristown, a series of experiments, with the crude wooden machine of Morse's construction. He soon became entirely absorbed in this work—so much so that he would often rise from his sleepless bed in the quiet hours of the night and continue his work.

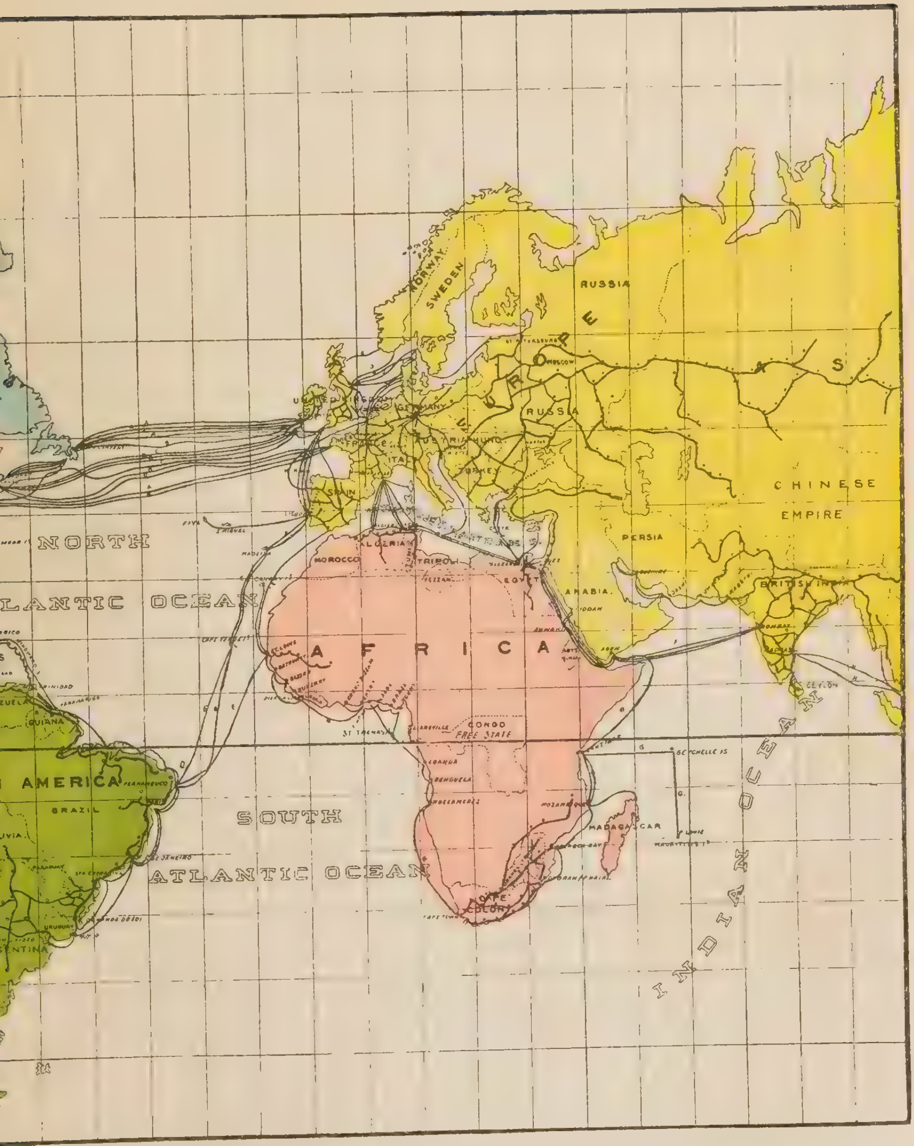
At this time, Professor Morse, who had returned to New York, wrote him, under date of September 29, 1837, as follows:

SUBMARINE AND LAND TE



A: ANGLO-AMERICAN TELEGRAPH COM
B: THE COMMERCIAL CABLE COMPANY
C: WESTERN UNION TELEGRAPH COMP
D: COMPAGNIE FRANCAISE DU TELEGRA
E: BRAZILIAN SUBMARINE TELEGRAPH
F: EASTERN TELEGRAPH COMPANY

SYSTEMS OF THE WORLD



ON

EASTERN AND SOUTH AFRICAN TELEGRAPH COMPANY
EASTERN EXTENSION, AUSTRALASIA AND CHINA TELEGRAPH COMPANY
GREAT NORTHERN TELEGRAPH COMPANY
WEST INDIA AND PANAMA TELEGRAPH COMPANY
CENTRAL AND SOUTH AMERICAN TELEGRAPH COMPANY.

"I have despatched my letter to the secretary of the treasury, and have the papers and drawings ready for the patent office. If you intend to do anything in England or France, no time is to be lost. I hold myself in readiness to execute the commission with respect to the portraits any time after next week, and hope to find the machinery in a state of such advancement, that we may have time before the winter session to become perfectly familiar with it, so as to strike conviction at once into the minds of the members of congress."

Morse soon returned to Speedwell to note the progress of his young associate, and at the same time to busy himself in painting the portraits of several members of Judge Vail's family, in fulfilment of his expressed desire to return, in the only way in his power, the kindness and attention shown him while an inmate of the judge's house. On January 6, 1838, a public demonstration was made at Speedwell, messages being sent over a length of three miles of wire. An exhibition was soon after given in New York, and a little later, in Philadelphia, and from there the mechanism was taken to Washington, where it was exhibited before congress and the cabinet.

On the 15th of February, 1838, Professor Morse, enclosing a communication to Hon. F. O. J. Smith, chairman of the committee on commerce of the house of representatives, wrote:

"If the government is disposed to test this mode of telegraphic communication, by enabling me to give it a fair trial for 100 miles, I will agree to enter into no arrangements to dispose of my rights, as the inventor and patentee for the United States, to any individual or company of individuals, previous to offering it to the government, for such a just and reasonable compensation as shall be mutually agreed upon. It is proper that I should here state that the patent right is now jointly owned, in unequal shares, by myself, Professor Gale, of New York City University, and Messrs. Alfred and George Vail."

The next four years were years of hope and despair, of appeal, ridicule, and fruitless struggles. Session after session, Morse and Vail persevered, and year after year they met with rebuffs and defeat. Their bill was amended by congressional wits to include a line of telegraph to the moon, and to pay for experiments in witchcraft, mesmerism, and Millerism, the speaker refusing to rule out the absurd amendment on the plea that it would require a scientific analysis to determine how far the magnetism of mesmerism was analogous to that employed in telegraphing.

On December 30, 1842, more than four and a half years later, another committee made a favorable report recommending the passage of a bill appropriating the sum of $30,000 for the purpose of "Constructing a line of said electro-magnetic telegraphs, under the superintendence of Prof. S. F. B. Morse, of such length, and between such points as shall fully test its practicability and utility, and that the same shall be expended under the direction of the postmaster-general, upon the application of the said Morse."

Notwithstanding this favorable recommendation to passage, no action was taken. At last came the close of the session of 1842–3. On the evening of March 3, the professor once more gave up in despair, and under the fire of the jests and witticisms that greeted his bill, left the capitol and returned despairing to his hotel, where, sitting down, he wrote to Mr. Vail, then in New York, informing him of the dark outlook, and the almost certain defeat of his bill, if, indeed, it was taken up at all, and closing his letter by saying:

"If the bill fails to pass before noon to-morrow, I shall return to New York without one dollar in my pocket!"

But his friends, deeply anxious that the bill should pass, stood by him, and in the last hour of the expiring session, by but a majority of six, the vote being eighty nine to eighty three, the bill appropriating $30,000 for the line to Baltimore, became a law, awaiting only the signature of the president.

The appropriation made by congress on the last night of the session brought into requisition the scientific and mechanical services of Mr. Vail, and he at once entered upon the completion of the enterprise, for so long a time his all-absorbing thought, with all the energy and earnestness of which he was capable.

Before leaving for Washington to exhibit the telegraph, in 1838, Mr. Vail devised and had constructed two instruments for receiving messages, which were used in the experiments at Speedwell, and later at Washington, and finally upon the line constructed between Washington and Baltimore. Upon the instrument used by Mr. Vail at Baltimore was received the historic message, "What hath God wrought!" This instrument—a receiving register—was carefully preserved by Mr. Vail, and its identity is fully established by a certificate to that effect from Professor Morse.

The instrument used by Morse at Washington, according to statements made by him, was lost, and has disappeared probably forever. With the exception of size and clumsiness, this receiving register is almost like those in present use, and can compare in efficiency in working with the latest made. Its size is sixteen inches long, seven inches high, and six inches wide. It has two magnets of three inches diameter, and weighs twenty pounds. Attached to it, when taken possession of by the writer, to whom it was bequeathed by his father, was a certificate in Mr. Vail's own hand, as follows:

"This lever and roller were invented by us, in the 6th story of the New York Observer office, in 1844, before we put up the telegraph line between Wash. & Balt. & the same has always been used in Morse's instrument. I am the sole & only inventor of this mode of telegraph embossed writing. Professor Morse gave me no clue to it, nor did any one else, & I have not asserted publicly my right as first and sole inventor, because I wished to preserve the peaceful unity of the invention, & because I could not, according to my contract with Professor Morse, have got a Patent for it.

"ALFRED VAIL."

This instrument has been, for some years, in the National Museum at Washington, to which institution it was loaned by the owner, and where it attracts much attention, because of its great historic interest. Professor Gale, in the case of Smith vs. Downing, presented diagrams of the veritable Morse machine of 1836, as it passed in September, 1837, into Alfred Vail's hands, for an entire mechanical reconstruction throughout, to speak a language not entirely unknown to the first machine, but to perform entirely new functions and to produce an entirely new system of signs and letters, which the first machine, by its structure, was physically incapable of being made to speak. Alfred Vail thus produced, in the new instrument, the first available Morse machine! He invented the first combination of the horizontal lever motion to actuate upon a pen or pencil or "style," and the entirely new telegraphic alphabet of dots, spaces, and marks, which it necessitated, not long before September, 1837, the month that Morse's old instrument passed into his hands for reconstruction. His more perfect invention of a steel style upon a lever, which could strike into the paper as it was drawn onward over a grooved roller, and emboss upon it the same alphabetical characters, was not invented until 1844, a short time before the first line of telegraph began to operate between Washington and Baltimore. This instrument, somewhat changed in shape only, still holds its place, as practically the best ever invented, and after standing all imaginable tests is not likely to be shaken from its firm pedestal of fame, in the "Morse-Vail System."

Alfred Vail also invented an entirely new alphabet, which he foresaw could be made to register easily on a horizontal line, with one continuous movement of the paper, from right to left. He invented an entirely new machine, in which was the first combination of the horizontal lever motion to actuate a pen, or pencil, or style, so arranged as to perform the new duties required, with a precision, simplicity, skill, and rapidity infinitely beyond the "stammering speech" and the creeping infantile movements of the true "Morse machine," as originally conceived and brought forth. Mr. Vail invented, several years afterward, the new lever and roller, which embossed into paper the wholly simple and perfect alphabetic characters which he alone had originated, altogether the complete invention used from the first opening of a telegraph line, until now, a period of over fifty five years. To this day, it has proved itself the best instrument ever made, as is sufficiently proved by its universal use, by all people, and all languages.

Under date of Washington, July 23, 1843, Mr. Vail, in a private letter, wrote:

"Our experiments have commenced and have, thus far, been perfectly successful. Our first have been tried upon forty three miles of wire, and the next time I write, I hope to be able to state the same success with more than one hundred miles of wire. I am very busy with the instruments."

Forty three miles, or twenty one and a half working miles, the extreme length of wire successfully used! Signals have been recently exchanged over an unbroken circuit of seven thousand two hundred miles, and conversation indulged in. On August 5th, 1843, Mr. Vail wrote:

"Yesterday we tried one hundred and fifty miles of wire with the utmost success. Upon which Professor Morse threw up his hat in joy! There now appears no limit to the length of wire over which the battery may operate. So you see, instead of sending our intelligence but forty miles, we have proof that we can send it seventy five miles. To-morrow we shall try it through one hundred and sixty miles, which will be a working distance of eighty miles."

On December 17, 1843, he wrote:

"You need not expect to see the telegraph, or hear of its being in operation, this winter, except perhaps between the patent office and the capitol. Our lead pipe is defective, and also our wires, so that it is probable we shall have to go over the whole wire again and varnish it."

To fully comprehend the allusions made in the preceding letter, it is necessary to understand that the line was first placed in leaden pipe, which was laid in a trench in the ground, the wire being a double length, making what is known as a "metallic circuit." This was considered necessary, the ability of the earth to furnish the return circuit not having then been discovered. In the words of Mr. Vail, that most important discovery is thus described:

"After the close of the session of congress in the spring, 1844, a series of experiments was commenced by the request of Professor Morse under my direction, for the purpose of ascertaining what amount of battery was absolutely required for the practical operation of the telegraph. From the commencement of its operation to the close of the session, so anxious was the public to witness its almost magic performances, that time could not be taken to put it in a state to test either the size of the battery required, or bring into use all the machinery of the register. On that account but one wire was used during that period for transmitting and receiving intelligence, and the capabilities of the instrument were shown at some disadvantage—requiring the constant attendance of those having charge of the two termini. The first experiment made was to ascertain the number of cups absolutely required for operating the telegraph; eighty cups had been the number in use. Upon experimenting it was found that two cups would operate the telegraph from Washington to Baltimore. This success was more than had been anticipated, and urged on further experiments, which eventually proved that the earth itself furnished sufficient galvanic power to operate the electromagnet without the aid of a battery. In the first experiment a copper plate was buried in the ground, and about three hundred yards from it a zinc plate was also buried. To each of these plates a wire was soldered, and the ends brought into the telegraph office, and properly connected with the key and electromagnet of the register—the battery not being in connection. Upon manipulating at the key it was found that the electromagnet was operated upon, and the pen of the register recorded. This led to another experiment upon a more magnificent scale, and nothing less than that of using the copper plate at Washington and the zinc plate at Baltimore, with the single wire connecting these distant points, the battery being thrown out. Here, too, success followed the experiment, though with diminished effect. By the application of a more delicate apparatus, the electromagnet was operated upon, and the pen of the registering instruments recorded its success. From these experiments the fact appears conclusive that the ground can, through the agency of metallic plates, constantly generate the galvanic fluid."

On December 22, 1843, Mr. Vail wrote:

"We have gone into winter quarters, and will not resume our outdoor enterprise until April perhaps. We have laid the pipes thus far about nine miles, and this is all we intend to do this winter. As the pipe is not soldered together, we have not tried it, and shall not until milder weather."

On January 1, 1844, he wrote:

"I should not wonder if all of the appropriation is exhausted before we are able to do anything. There is more going on here than you can possibly dream of. But you cannot know; only I am not in the scrape. You may hear of it soon through the public prints."

January 6, 1844:

"We are about to stretch our wires from the capitol to the city hall, and from there to the patent office, when we will have a pay thing in operation for the winter. Dr. Gale has resigned, so I am left pretty much alone with Professor Morse."

March 2, 1844:

"We have put up some posts, and commenced putting the wires thereon."

March 19, 1844:

"We have now some of the pipe prepared, and shall probably lay it, or some of it, this week. In all this month, we hope to have the wires laid between the capitol and patent office, and also the wires stretched from pole to pole to the distance of twelve miles, from the capitol to Belleville. I am very anxious to have it completed, so that we may know what is to be expected in the future."

April 11, 1844:

"I will inform you of what success with the telegraph. We have tried it six miles, though it is now put up nine miles, and by Saturday will be twelve. It has given the utmost satisfaction thus far, and performs perfectly. A few days since, I was at this end of the line, and Professor Morse at the other. From there he announced that the cars were passing, and he says I answered him before the train had passed! To-day we have put up the instruments at the capitol, where the wires terminate. We have two fine rooms, one for the instruments and the other for the battery, and we expect to have the whole line completed to Baltimore by the 17th of next month. The utmost curiosity exists about it, and when we get started, we shall have our rooms constantly thronged with visitors. I am waiting, with the utmost anxiety, to have the final trial made with the telegraph to see what will be the fate of things. We expect to get another appropriation, if this results successfully, and of this I have no doubt. Professor Morse is on tiptoe, as you may well imagine. No one seems disposed to injure our wires, and all goes on well."

April 18, 1844:

"We have tried the wires for fourteen miles, as far as they have been put up, and they work well. We talk back and forth every day upon them. The work is proceeding, and we shall soon be in Baltimore. I am so hurried and driven that I have not time to take any meals. I am up and off sometimes long before it is light, am gone all day, and back at six o'clock. I go to Bladensburgh, sometimes to Belleville, and other parts of the work."

April 22, 1844:

"We now have the wires put up sixteen miles, and yesterday afternoon I tested them by telegraphing from White Oak Bottom to Washington. We talk back and forth almost every day, and find it to succeed very well, and I see no reason why it should not go through the whole distance. It is progressing very fast, and we hope to have it through by the middle of May, when you may expect a great noise in this part of the world. As it is, I see the papers are full of it, but they do not keep pace with our operations. It excites considerable interest and astonishment wherever it is known or seen, and we have lots of fun sometimes with those who are curious to know everything. At this end of the line yesterday the shocks were very severe, so much so that I could hardly manage the wires. Just imagine posts, two hundred feet apart, along the railroad, with two wires stretched between them, and you have the telegraph. The lead pipe we are selling for old lead, so that so much goes back into the appropriation. We have enough, and more than enough, to take us through. What will be the result to our pockets, after what is completed, and before congress, I know not. Perhaps they will make another appropriation, or we may settle with them for the whole of it. Perhaps not. I do not think much about it at present. I want to see it in operation first."

April 28, 1844:

" . . . . It is as much as I can do to keep Professor Morse from being sick, and he don't seem to know sometimes how to operate his own instrument. I have spent the week as usual, and to-morrow go to the Junction, twenty-two miles from here, to prepare to announce the Whig candidate selected by the Baltimore convention. Yesterday I was at Bladensburgh, and the day being wet and cold, and I, without my coat and umbrella, I wrote, by telegraph, to Professor Morse to send them to me by the four o'clock train, which he did! So you see it works well. We are going on with the wires to Baltimore as fast as possible, and hope to be there in two weeks!"

On May 1, 1844, Professor Morse wrote to Mr. Vail, at Annapolis Junction:

"Get from passengers, in the cars, all the news you can, and transmit. A good way of exciting wonder will be to tell the passengers to give you some short sentence to send me and let them note the time, and call at the capitol to verify the time I received it. Before transmitting, notify me (48). Your message to-day that the passengers in the cars gave three cheers for Henry Clay, excited the highest wonder in the passenger who gave it to you to send, when he found it verified at the capitol."

On May 2, Mr. Vail wrote:

"I yesterday announced the nomination of Henry Clay and Frelinghuysen, at Washington, one hour and a quarter before the cars arrived there, distance twenty-two miles. Professor Morse is so unstable and full of notions. He changes oftener than the wind, and seems to be exceedingly childish sometimes. Now he is elated up to the skies, and then he is down in the mud all over under. It requires the utmost patience to get along with him. So far the telegraph succeeds perfectly, and perhaps in two weeks we shall be in Baltimore. The telegraph produces a great deal of excitement, and we are thronged with visitors. When we get to Baltimore it will be more astonishing. Persons at the capitol ask Professor Morse to ask me to write their names, that they may say that they were written in Washington by a person at the Junction. I was obliged to write Mr. Frelinghuysen's name a dozen times last night for as many persons, who wanted the intelligence. I hope the thing will come to something by and by!"

On May 11, 1844, Professor Morse wrote to Mr. Vail:

"Everything worked well yesterday, but there is one defect in your writing; make a longer space between each word. I shall have a great crowd to-day, and wish all things to go off well. Many M. C's. will be present, perhaps Mr. Clay; give me news by the cars. When the cars come along, try and get a newspaper from Philadelphia or New York, and give items of intelligence. The arrival of the cars at the Junction begins to excite here the greatest interest, and both morning and evening I have my room thronged."

The news of the passage of the bill before congress to appropriate the thirty thousand dollars, to construct the experimental line, was taken to Professor Morse on the morning after its passage (March 4, 1843), by Miss Annie Ellsworth (the daughter of the commissioner of patents), who had taken the deepest interest in the trials and efforts of the enthusiasts; and the professor promised, as her reward, that she should send the first message that passed over the line to Baltimore. On May 24, 1844, the end of the line having reached that city, the connections established, and everything being in working order, Miss Ellsworth was notified that the telegraph awaited her message. Going to the supreme court chamber, at the capitol, she gave to Professor Morse the message, which has since become historic: "What hath God wrought!" which was received by Alfred Vail, at the Mount Clare depot of the B. & O. R. R. at Baltimore; and the identical slip of paper as it came from the recording register with its memorable words embossed upon it, is now in the possession of the Historical society of Connecticut at Hartford, where Miss Ellsworth afterwards placed it.

The following is copied from Mr. Vail's diary:

"BALTIMORE, May 24, 1844.

" 'What hath God wrought? M. Yes, V.'

" 'The City of Baltimore, V. Yes, M.'
" 'Stop a few minutes, M. Yes, V.' "

"BALTIMORE, May 26.

" 'I am ready, M.' 'Yes, V.' 'Have you any news? M.' 'No, V.' 'Mr. Saxton's respects to you, M.' 'My respects to him, V.' 'What time have you? V.' 'Nine o'clock, twenty-seven minutes, M.' 'What is your time? M.' 'Nine o'clock, twenty-eight minutes, V.' 'What weather have you? M.' 'Cloudy, V.' 'Separate your words more, M.' 'Oil your clockwork, V.' 'I have a great crowd at my window, M.' 'Oh! Ah! V.' 'A Van-Buren cannon in front with a fox-tail upon it, V.' 'I wait for news, M.' 'State Convenvention met at the Odeon ten o'clock A. M., V.' "

Under date June 4, 1844, the secretary of the treasury transmitted the "report of Professor Morse, announcing completion of the electromagnetic telegraph between the cities of Washington and Baltimore, as authorized by the 'Act to test the practicability of establishing a system of electromagnetic telegraphs by the United States,' approved the 3d of March, 1843."

"WASHINGTON, June 3, 1844.

Hon. McClintock Young, Secretary of the Treasury:

"SIR,—I have the honor to report that the experimental essay authorized by the act of congress on March 3, 1843, appropriating $30,000 for 'testing my system of electromagnetic telegraphs, and of such length and between such points as shall test its practicability and utility' has been made between Washington and Baltimore—a distance of forty miles—connecting the capitol in the former city with the railroad depot in Pratt street in the latter city.

On the first point proposed to be settled by the experiment—to wit its practicability—it is scarcely necessary to say (since the public demonstration which has been given of its efficacy for some days past during the session of the different conventions in the city of Baltimore) that it is fully proved. Items of intelligence of all kinds have been transmitted back and forth from the simple sending of names, to the more lengthened details of the proceedings of congress and conventions. One fact will perhaps be sufficient to illustrate the efficiency and speed with which intelligence can be communicated by the telegraph.

In the proceedings of the democratic convention at Baltimore, for the nomination of a candidate for president of the United States, at the next election, the result of the votes, in the nomination of the Hon. J. R. Polk, was conveyed from the convention to the telegraphic terminus in Baltimore, transmitted to Washington, announced to the hundreds assembled in front of the terminus, at the capitol, and to both houses of congress. The reception of the news was then transmitted to Baltimore, sent to the convention, and circulated among its members—all before the nomination of the successful candidate was officially announced by the presiding officer of the convention. . . . In the construction of this first line of conductors, it was necessary that experiments should be made to ascertain the best mode of establishing them. The place I first suggested, in my letter to the secretary of the treasury, in 1837, of placing my conductors upon posts thirty feet high and some three hundred feet apart, is, after experiment, proved to be the most eligible. The objection, so strongly urged in the outset, that by being exposed above ground the conductors were in danger from evil-disposed persons, had such weight with us, in the absence of experience on the subject, as early to turn our whole attention to the practicability of placing the conductors in tubes beneath the earth, as the best means of safety. The adoption of the latter mode for some thirteen miles in England, by the projectors of the English telegraph, confirmed me in the belief that this would be best. I was thus led to contract for lead pipe sufficient to contain the conductors through the whole route. Experience, however, has shown that this mode is attended with disadvantages far outweighing any advantages from its fancied security beneath the ground. If apparently more secure, an injury, once sustained, is much more difficult of access and of repair; while upon posts, if injury is sustained, it is at once seen, and can be repaired ordinarily almost without cost."

The erection of the line from Philadelphia to New York was begun in the fall of 1845, and on January 4, 1846, Mr. Vail wrote from that city:

"I have been very busy since I arrived here, putting up the instruments and getting the necessary things for the office. On January 1st, we made the first trial of the wires between here and Norristown—eighteen miles—and all went off very well. I have had the lines in operation every day since, but not open to the public, as I dislike to have persons running to the office when I am testing the wires, and not prepared to do business. In a few days I shall remove the instruments from Norristown to Doylestown, and then further on the route to New York."

Philadelphia, January 8, 1846:

"I have had the instruments moved to Doylestown, further on the line, and crowds of persons are visiting the instruments every day, which keeps me very busy. I have much before me, and apprehend some difficulties before I get the wires tested through to Newark."

Philadelphia, January 18, 1846:

"We have tested the line almost through, and the other end is now at Newark, nine miles from New York. To-morrow we expect to communicate to Newark, and hope soon after to test to New York. Our operations produce great excitement, and my room is crowded from morning to night, and I sell some days as many as one hundred and sixty pamphlets."

Philadelphia, January 24, 1846:

"The telegraph is going ahead and must go! It cannot stop now! The line is in operation between this and Newark!"

Upon reaching the city of Newark, N. J., it was determined to seek business between New York and Philadelphia, and the following notice to that effect was issued to the public:

New York, January 26, 1846.

Sir—The magnetic telegraph between New York and Philadelphia via Newark will be opened to the public on Tuesday, January 27. Messages will be dispatched from the telegraph office, No. 10 Wall Street (basement), New York, at 9, 11 A. M., and 12 o'clock M.—3, 4, and 7 P. M., and will be received from Philadelphia via Newark at 8½, 9½, and 11½ A.M., and 2½, 4½, and 10 P. M. Communications, which must all be prepaid, will be sent in the order they are received.

The following are the rates established for ten words and under:—For the transmission and writing out of every communication, not exceeding ten words, exclusive of the signature and address, and the directions of the writer as to the disposition of the communication from New York to Philadelphia—twenty-five cents. For every addition not exceeding ten words, the same rate of charge as in the first ten.

Yours truly,
Amos Kendall, President.

The line was completed as far as Fort Lee, on the Jersey shore of the Hudson river, opposite the upper part of Manhattan island, on January 20, 1846; but there the river presented an obstacle that for some time was not overcome, no method of insulation in water having then been discovered. On the New York side of the river was the residence of the naturalist Audubon, and his consent being obtained for the establishment of an office on his premises, messages were brought from Fort Lee by boat, and sent to the city of New York by wire.

The reproduction of some minor items of interest may not be found uninstructive. The telegraph was shown without charge, in Washington, until April 1, 1845. Congress during the session of 1844–5 made an appropriation of eight thousand dollars to keep it in operation during the year, placing it under the supervision of the postmaster-general, who ordered a tariff of charges of one cent for every four characters, appointing as operators of the line, Mr. Vail at Washington and Mr. N. J. Rogers at Baltimore. This commenced April 1, and was to test the profitableness of the enterprise. Mr. Polk had just been inaugurated, and the city was filled with persons seeking office. On the 4th, a gentleman of Virginia came to the office and desired to see the operation of the telegraph without cost. He was asked if he had seen the postmaster-general, and obtained his consent. He replied, he had not. After considerable discussion, he said that he had nothing less than a twenty dollar bill, and one cent, all of which he took out from his breeches pocket. He was told that he could have a cent's worth of telegraphing, and was finally gratified in the following manner: Washington asked

Baltimore: 4—which meant, in the list of signals, What time is it? Baltimore replied: 1 —which meant, one o'clock. The amount of the operation was one character each way, making two in all, which at the rate of four for one cent, would amount to exactly one-half of one cent! He laid down his cent, but was told that half a cent would suffice, if he could produce the change. This he declined to do, and gave the whole cent, upon which, being satisfied, he left the office. This then, was the income of the Washington office, for the first four days of the public life of the telegraph! On the 5th, twelve and a half cents were received. The 6th was Sunday. On the 7th, the receipts were up to sixty cents; on the 8th to $1.32; and on the 9th to $1.04. "It is worthy of remark," said Mr. Vail, "that more business was done by the merchants after the tariff was laid, than when service was gratuitous."

Can the average mind fully comprehend the change that has taken place in the business done by the telegraph in a little over one short half century? In every direction, wires now stretch from pole to pole, or under the seas, all grown from that little strand forty miles long, which so recently as May 24, 1844, was all that existed of that great network of wire, which now covers the earth. Sixty years have seen this forty miles grow to millions; and in this country alone, one company has a capitalization of $85,000,000, with over 16,000 offices, from which there were sent in one year nearly 70,000,000 messages, earning a revenue of nearly $50,000,000.

RECENT PROGRESS OF THE TELEGRAPH.

BY MORTIMER W. COURTRIGHT.

[Mortimer W. Courtwright, telegrapher; he was born in 1859, in Moundsville, W. Va., educated in the public schools; became a telegraph operator at the age of fifteen years, and was with the Baltimore and Ohio railroad telegraph company until 1878; removed to Chicago and became a chief operator for the Western Union Telegraph company; has contributed articles to magazines and newspapers on the history of telegraphy.]

Considering the enormous extent of the telegraph and cable service of to-day and the millions of capital invested in this wired and wireless system of rapid communication, it is remarkable to recall that the first rude experiment with the telegraph instrument under the Morse code was made with three miles of copper wire around the room of a factory at Morristown, N. J., on January 6, 1838. The experiment was a success, public tests were made on February 8th in the Franklin institution at Philadelphia, and soon afterwards the apparatus was exhibited to the president of the United States and members of his cabinet. And yet, near the close of the year 1841, this inventor of the electric telegraph wrote to his friend Vail, in the course of the letter saying: "I have not a cent in the world!"

But congress came to his aid. His experiments were demonstrated as practicable, yet the national government refused to buy Morse's invention for $100,000. At once the electric telegraph was presented to the public and capital invited to take stock in the first line from Baltimore to Washington. It was opened for business on April 1, 1845. The first four days' revenue was 1 cent, the fifth was a Yankee shilling, and after nine days of operation the income of the venture was less than $4. On July 7, 1846, the treasurer of the Magnetic Telegraph company reported that the profits for the three preceding months had been $223.50 at Philadelphia and $293.17 at the New York office.

The force of the line at that time was regulated by resolution of the directors of the company, the order going out that the office forces everywhere would have to look to the office receipts to square the salary rolls. At Washington there was one operator, Jersey City had three, Wall Street in New York had three boys and one clerk, Philadelphia had three operators, one clerk, and three boys; Wilmington had one operator, and at Baltimore were two operators and one boy.

Office rents paid in New York were $250 a year; in Philadelphia, $150; in Baltimore, $150; and in Washington only $50 a year. One thing had impressed the new magnetic telegraph indelibly upon the public mind. The national convention which had nominated James K. Polk for president at Baltimore named United States Senator Silas Wright for the vice presidency. Wright was in Washington, and when the news of the nominations were telegraphed there from Baltimore the newly nominated vice president resented and refused the honor, and there for the first time in history sent back by electric telegraph his declination of the honor.

Even as late as July 12, 1849, however, in an official report of one of the officials of the New York line there was the sentence, "I do not intend to say that both wires have worked independently of each other, or that the line has worked through without repeating, but that it has been in the power of the company, with but few interruptions, to send messages from Washington to New York."

When the Western Union Telegraph company was chartered in New York and in Wisconsin in the spring of 1856 it was in readiness to absorb with its $500,000 capital more than half a dozen independent and competing lines east, north, south, and west. All the Morse patents went to the new company, and only the western O'Reilly lines were left to compete with the united companies.

But it was in 1861 that a marked expression was given connecting the telegraph line almost inseparably with the rails of the steam railroad. D. C. McCallum had succeeded to the presidency of the old Erie railroad and had made use of the telegraph in the operations of trains on that line. In his annual report to the road's board of directors he spoke of the telegraph, which had been dubbed an "ornamental branch" of the service, saying: "I would rather have a road of a single track with the electric telegraph to manage the movement of trains than to have a double track without it."

After the building of the Overland Telegraph line from Brownsville, Mo., to San Francisco by way of Salt Lake City, the Western Union company absorbed the western line, giving to the organization a prestige and power that made it at that time the monopoly of monopolies. In the summer of 1866 the Atlantic cable, original with Cyrus W. Field, but which had proved difficult of laying through several years, was completed, and from that time to the present the world has been made whole through the Morse alphabet.

The American Union Telegraph company was chartered in New York on May 15, 1879, with a capital of $10,000,000, devoted to the battling of the forces of the Western Union company. Jay Gould and Russell Sage were among the incorporators. Within a year the company had 50,000 miles of wires, 2,000 offices, and connected the cities of New York, Boston, Washington, New Orleans, Kansas City, Chicago, St. Louis, and the intervening towns and cities. Business arrangements were made with railroads in every direction, and before the close of 1880 the new company was earning 6 per cent upon its capital stock.

On January 9th there was a conference between Gould of the new company and Vanderbilt of the old one. The Western Union lines were showing a falling off of $5,000 a day. The consolidation that was inevitable came about only after injunctions and suits, counter suits, and the warring processes instituted in the courts by stockholders in each of the companies. The Gould system of railroads had given to the American Union company its prestige and power, but not till 1883 did the courts of New York render the final decision recognizing the right to consolidate.

Since that consolidation other independent small companies have come into the field in the United States, and the Postal Union company has come into competition with the Western Union until even with the growth of the telephone service in every direction the wires of the electric telegraph reach to the uttermost parts of the country. No village is too remote from the service to make it practicable, while in the business and social relations of the world the tick of the telegraph instrument has come to be indispensable.

At the same time, the electrician to-day will tell you that the electric telegraph is the crudest of all the applications of the element, and that the telegraph companies, in the same breath, are the least progressive of all the aggregations of capital. This, perhaps, leaves out of consideration the wireless service as far as it has progressed. And this seems to have progressed to the point where a man and his wife, recently sailing from Liverpool, and missing the family jewels, which the wife had secreted in a fireplace in London, were enabled to send a wireless message from midocean, by which the landlord of the hotel with the fireplace recovered the gems.

In the field of telegraphy hand labor is maintained to a striking extent. The vast number of messages are still sent by the key and received from the sounder, though at the present time one wire may carry twelve messages distinctly between points several hundred miles apart. This is the elaboration of Edison's quadruplex, and was perfected by Delaney, the several operators on the lines getting the use of the current for a brief space long enough for the sounder to respond to the special impulse directed at it.

It is one of the oddities of the service of telegraphy that, while the writing and printing systems were early introduced into the work of transmitting messages, the key is in almost universal use to-day. The Wheatstone system is the exception, in which messages are prepared by punching holes in a tape, which afterwards is run rapidly through a mechanical transmitter. At the other end of the line an ink writing machine receives the message, in which the dots and dashes are recorded on another tape to be translated into words.

A feature of this method is that several operators may work at getting a tape ready for transmission and when it is ready a speed of 400 words a minute may be attained. This same punctured tape, too, may be used through several instruments, sending the message over several lines if need be. With this possibility of 400 words a minute by the tape method and only forty words possible by hand to the ordinary operator, the value of the tape process is apparent.

Automatic telegraphy has been looked upon by the inventors as the solution of a wire rate system that shall compete with the telephone and the special delivery mail service. Delaney and C. L. Buckingham have been the chief representatives of the automatic idea. With the Buckingham instrument on one occasion 2,429 words were sent from Chicago to New York in twenty three minutes and twenty four seconds. This is the printing device, and under the ordinary uses of the mechanism it transmits about 100 average messages over one wire in each direction. These messages, too, come out in typewritten form on standard message blanks ready for instant delivery.

The stock ticker as it serves to-day in the financial transactions of the world was conceived in 1867. It was the virtual forerunner of the telephone and district messenger system and was evolved out of the necessities of the stock broker to keep in touch with the exchanges. Frequently a brokerage firm would need a line of twelve to fifteen boys for this service.

A dial indicating the fluctuating price of gold was the first invention, and following this came a system of type wheels operating upon a paper tape, one line of letters and one of figures being imprinted. For this work it was necessary to ink the type wheels, move the tape through, and take the impression on the paper. Edison, S. D. Field, G. B. Scott, G. M. Phelps, and others have worked out the modern stock ticker to its present stage of usefulness and perfection. One alphabet wheel now suffices for the printing and the old winding weight has been dispensed with in favor of an ingenious device that is self-winding.

For fifty years the fire alarm telegraph has been in use in the United States, and every important city in the country is equipped with the service. Everywhere in metropolitan streets the red box is visible, the old types operating with a key and the new ones automatically. When the mechanism of such a box has been set in motion the sender of the alarm cannot stop it, nor can any subsequent alarm from another box confuse the message of the first. Auxiliary boxes have been placed in buildings where in case of fire they may energize the alarm box in the street nearest the automatic auxiliary.

A modification of the telegraph idea in America is the messenger call, whose buzzings are as familiar to the citizen in downtown offices as are the sounds from the telephone bell. It was evolved in 1870 through the application of a Brooklyn electrician named Calahan. Mr. Calahan already had experienced the difficulties of working on the stock ticker, and he turned to the simpler apparatus with a sense of certainty. It was designed first to call a district messenger, with additional fire calls and notifications to the police.

As this call was first manufactured it required a winding about once a year. Under recent patents the call is now wound by the operator's turning in the signal, and in most of these instruments only the messenger call has been retained, the telephone in many cities taking even this place of the apparatus.

In the progress of the telegraph there were obstacles in many sections of the United States that seemed impossible to overcome. In one of the early lines out of Washington a copper wire was used, which, while large enough in diameter, was brittle enough in tensile qualities. One memorable night there was a rain slowly turning into sleet, and the next morning the wires were an inch in diameter, sagging to the limits of the overweighted poles. Then, on the heels of the rain and sleet, came a heavy wind, that increased until forty miles of the lines were in hopeless chaos of broken poles and twisted wires. In some of the sections of New York these wires were sold to the hop growers to support the vines.

When the Overland Telegraph company was building east and west toward Salt Lake City there was fear that the Indians would interfere with the wires. They did in a measure when they learned that news of their depredations was sent over the wires to the government authorities. But later, with the completion of the overland railroads, the telegraph lines followed the rails, and the Indians no longer meddled with the lines.

But after the Indians had ceased to break the lines the small boy and the adult rifle shot, with stones and bullets, worked havoc with the glass insulators capping the poles. Many expedients were resorted to for the prevention of this, but in the end the return was to glass. But in that period when the new insulators suffered most the inventive genius of the country turned out a museum full of insulators. Gutta percha, iron coverings for the glass knobs, and even cow horns from Texas were used. The present heavy insulator, screwing upon the tip, so that no upward lift will force it off, seems to meet all requirements.

SUBMARINE TELEGRAPHS.

BY FREDERIC ROYCE.

[Frederic Royce, editor; born Waterloo, Ind., in 1861; educated in the public schools; editor of the Hastings (Neb.) Journal-Gazette, 1883–90; political editor of the Omaha Bee, 1890–97; made special study of political history of the United States and foreign governments, especially with relation to the present generation; telegraph editor Chicago Tribune, 1897; foreign editor of that paper, 1898–1905. Author of History of Nebraska and many articles in newspapers and periodicals on foreign affairs.]

America's part in the development of the submarine telegraph system of the world has been large. The stimulus for the construction of the first cable line across the Atlantic came from the United States. It was Prof. Samuel F. B. Morse who, in 1842, first transmitted electric signals through an insulated copper wire between Castle Garden and Governor's Island, thus demonstrating the practicability of submarine telegraphy. A year later Prof. Morse suggested a submarine cable between the United States and Europe. In the same year, 1843, Samuel Colt successfully operated a submarine telegraph between New York city, Coney island and Fire island. In 1845 Cornell laid and successfully operated twelve miles of submarine copper wires in the Hudson river, between New York and Fort Lee, continuing its use for several months, until its destruction by ice. His wires were insulated with cotton and inclosed in a leaden pipe. These experiments demonstrated that submarine telegraphy was possible for short distances, even though the systems used were crude and unsatisfactory and the results obtained not the best.

In the meantime electrical scientists in England had been working along similar lines, with similar results, and in 1850 a submarine cable was laid across the English channel and signals exchanged. The cable soon ceased to work, the insulation proving insufficient. The following year, however, a cable containing four copper wires, insulated with gutta percha, surrounded by tarred hemp, and protected by ten galvanized iron wires wound spirally about it, was laid across the English channel by a company of English and

French capitalists. This line worked successfully and was opened for public business on Nov. 13, 1851, being the first practical submarine telegraph line in the world. It continued in constant use for many years. Its weight was seven tons to the mile, its length twenty-five miles, and the depth of the water in which it was laid was about 120 feet. It was laid from an oblong coil on a pontoon hull or barge towed by two steamers. The successful working of this cable gave an impetus to submarine telegraphy in England. In 1853 six cables were laid connecting England with Ireland, Scotland and the continent of Europe, the longest being about one hundred nautical miles, and all working successfully. In 1854 five additional cables were laid in European waters, the longest being sixty-four miles. In 1856 several additional cables were laid in deeper waters than in former experiments, one from Newfoundland to Cape Breton, and one from Spezia, Italy, to the island of Corsica, at a depth of six hundred feet.

But in all these years of experiment on the European side of the Atlantic no one abroad had advocated a cable across the ocean to connect the old and new worlds. This great achievement, daring in its conception, was left to American courage, American science and American capital. The United States, therefore, may justly claim the credit for inaugurating the series of great ocean enterprises, which in modern years have bound the continents together and linked by invisible threads nearly every island of the seas.

In the history of American development of the submarine cable, the name of Cyrus W. Field shines prominently on every page. His name is so firmly connected with the subject of ocean telegraphy that it may be said in all truth that he is the father of the great systems which to-day girdle and regirdle the globe.

In 1853—even before that he had conceived the idea—Cyrus W. Field called to his home in New York five men. In the library around a table littered with maps, charts, plans and estimates, these six men—Cyrus W. Field, David Dudley Field, Peter Cooper, Moses Taylor, Marshall O. Roberts and Chandler White, discussed the project of building a telegraph line from Nova Scotia to St. Johns, N. F., there to be carried across the Atlantic ocean to the coast of Ireland. For four successive evenings these six men discussed the project in all its bearings, decided it was feasible, and agreed among themselves to carry it out, with their own capital.

"It was a very pretty plan on paper," said Cyrus Field afterwards. "There was New York and there was St. Johns, only about 1,200 miles apart. It was easy to draw a line from one point to another—making no account of the forests and mountains and swamps and rivers and gulfs that lay in our way. Not one of us had ever seen the country or had any idea of the obstacles to be overcome. We thought we could build the line in a few months. It took two years and a half. Yet we never asked for help outside our own little circle. Indeed, I fear we should not have got it if we had, for few had any faith in our scheme. Every dollar came out of our own pockets. Yet I am proud to say that no man drew back. No man proved a deserter. Those who came first into the work stood by it to the end."

The ocean surveys for the first Atlantic cable were made wholly under American auspices. The first soundings across the Atlantic were made by American officers in American ships. The U. S. S. Dolphin had discovered the telegraph plateau in 1853 and in 1856 the U. S. S. Arctic completed the soundings from Newfoundland to Ireland, a year before the British government sent a warship over the same course for the same purposes.

For two years and a half Cyrus W. Field and his American associates worked at their project, spending more than $1,250,000 of their own money. They built the 1,200 miles of land line to connect New York with Newfoundland and did the preliminary work on the proposed submarine cable from Newfoundland to Valentia, Ireland. The length of cable needed was estimated at 2,500 miles. By the beginning of 1857 English science and capital were enlisted and Charles Bright, John W. Brett and Dr. Whitehouse associated themselves with Cyrus W. Field and his American colleagues and the Atlantic Telegraph company was organized. The

American and British governments took an active interest in the project, supplying ships, officers, engineers and men, and aiding in every way possible the enterprise. The Anglo-American company began work with every hope of success, but after 255 miles of cable had been laid from Valentia westward the cable broke and the work was abandoned.

The company, nothing discouraged by its first failure, renewed its efforts at once, and in 1858 a new cable was manufactured. The U. S. S. Niagara and the British naval vessel Agamemnon, each carrying one half of the cable, proceeded to midocean and after splicing the ends of their respective sections, on July 29, proceeded westward and eastward, paying out the cable and reaching their respective destinations, Newfoundland and Valentia, on the same day, August 5, 1858. Electrical connections were at once established over the 2,050 miles of nautical cable which had thus been laid. Congratulatory messages were exchanged between the president of the United States and the queen of England, and there were great public rejoicings in both countries over what was pronounced the greatest commercial and scientific achievement of a century. After less than one month's operation, however, the cable ceased to work. Somewhere in midocean it had parted and it was never operated further, nor was any part of it ever recovered. During its brief period of usefulness, however, it carried 730 messages, or an aggregate of about 10,000 words. Its total cost was $1,256,250.

The failure of the first Atlantic cable nearly proved disastrous to all submarine telegraph enterprises. Its failure was followed by an equally disappointing attempt to connect England with British India by cable. In 1859 a cable was laid through the Red sea and Arabian sea, to Kurrachee, India, a distance of 3,043 nautical miles, but with several intermediate landings. Some portions of the line worked satisfactorily for thirty days, but few if any messages were ever sent through the entire line and it proved a complete failure.

These two notable failures in submarine telegraphy did not discourage Cyrus Field and his English associates. The public faith wavered, but theirs never. In the United States the civil war blocked all American efforts to construct a cable across the Atlantic. In England, however, the project was still kept alive, the original Atlantic Telegraph company keeping up its organization and laboring incessantly to enlist the support of the public. Finally, the British government appointed a royal commission to investigate the whole subject. The commission was composed of eminent scientific men and practical engineers—Galton, Wheatstone, Fairbairn, Bidder, Varley, Latimer and Edwin Clark. They were aided by such eminent engineers as Stephenson, Brunel, Whitworth, Penn, Lloyd, and Josiah Field, who gave their time and thought and labor freely, refusing all compensation. The commission sat for nearly two years, spending many thousands of dollars in experiments. The result of their efforts was a clear conviction in every mind that it was possible to operate successfully a submarine telegraph across the Atlantic ocean.

In the meantime commercial enterprise was busy in making practical application of the discoveries constantly being made by the British royal commission. In 1861 a submarine cable, which had been manufactured with great care, was laid across the Mediterranean from Malta to Alexandria, Egypt, with intermediate landing places at Tripoli and Benghazi. The cable consisted of seven copper wires stranded together, covered with several coatings of gutta percha alternated with other nonconducting and waterproof material and in turn covered and protected by eighteen iron wires wound spirally about this core. This cable proved a permanent success and went into general operation shortly after its construction. The speed of transmission, which on the first Atlantic cable during its brief period of usefulness had been but three words per minute, was brought up to ten words per minute on each separate section, but still it remained only three words per minute when all the sections were united and operated as a single line of 1,331 nautical miles.

Again in 1864, an effort was made to connect England and British India by cable, this time successfully. The line was laid through the Arabian sea and the Persian gulf to connect with land lines across Arabia and Europe to Calais, France, thence under the English channel. The submerged line in the Arabian sea and the Persian gulf had a total length of 1,450 miles, but with three intermediate landing places. This line consisted of a copper core, surrounded with layers of gutta percha, alternating with other nonconducting and waterproof material, being protected by an outer sheathing of twelve galvanized iron wires wound spirally about it, which in turn were protected by double wrappings of tarred hemp yarn. All of these materials and the various sections of the cable were constantly and thoroughly tested electrically and otherwise during its construction. The line when laid proved a complete success, being the first successful telegraphic connection between England and India.

The successful operation of the submarine cables to Egypt and India lent confidence to men of capital in Great Britain, but had little effect on the investing public in the United States. But Cyrus Field persisted in his efforts, despite all discouragements. The United States had just passed through the greatest war in history. The problems of financing the government in its expenditures in putting down the rebellion had taxed the resources of American finance to the limit, and it was not strange that Mr. Field met with constant discouragements. By persistent efforts in New York city he succeeded in getting subscriptions of $350,000. Then Loring Andrews of New York subscribed $100,000 in a lump; but that was the end of Mr. Field's success in the United States and reluctantly he was compelled to go to England in his efforts to secure the capital he needed—he wanted $3,000,000. Finally by the aid of Thomas Brassey, who alone subscribed $300,000, Mr. Field succeeded and he was at length ready to make another effort to span the Atlantic with a submarine cable.

The company invested $3,000,000 in the cable itself. Its construction made many advances over previous efforts. It consisted first of seven copper wires, surrounded by numerous coatings of gutta percha and other waterproof nonconductors. This in turn was surrounded with ten Bessemer steel wires, this being the first use of steel wires for cable protection, each wire being wound separately with pitch soaked hemp yarn, the shore ends being also further protected by thirty six heavy iron wires wound spirally about the completed cable. The Great Eastern, then the largest steamship afloat, was purchased and specially refitted for the purpose of storing and laying the cable, and special machinery was invented and made for paying out the line. Great care was exercised in every detail, but after the Great Eastern had paid out 1,186 miles of the cable westward from Valentia, the line broke in water more than 11,000 feet deep. The Great Eastern dragged the bottom of the ocean for nine days and nights in an effort to recover the cable. Three times the grapples caught, but the cable could not be brought to the surface.

In 1866 Mr. Field and his associates in the United States and Great Britain renewed their efforts. A new company was formed, with a capital of $3,000,000, for the double purpose of finding the end of the cable partly laid in 1865, and completing the line, and also to lay another cable parallel with and near it. The cable manufactured for the proposed new line was similar to that of 1865, but with the shore ends also protected by wrappings of tarred hemp outside the thirty-six iron wires which surrounded the cable proper. The Great Eastern was remodelled further to meet the requirements of the work. With the new cable on board it sailed from Valentia, Ireland, on July 13, 1866, paying out the cable in a line about twenty-five miles north of that followed on the preceding year. The Great Eastern arrived safely in Newfoundland in fourteen days from the date of leaving Valentia, and electrical communication was immediately established between the United States and Great Britain. Since that date communication has never been broken more than temporarily.

Having successfully laid this cable the Great Eastern returned to the spot where the cable had been lost the year before. The story of the eighteen days and nights of effort to recover the lost cable has never been more graphically told than by Cyrus W. Field himself, when, speaking at a dinner given him and his associates by the New York chamber of commerce, on Nov. 15, 1866, he said:

"Having taken our bearings we stood off three or four miles, so as to come broadside on, and then casting over the grapnel we drifted slowly down upon it, dragging the bottom of the ocean as we went. Our fishing line was of formidable size. It was made of rope twisted with wire of steel so as to bear a strain of thirty tons. It took about two hours for the grapnel to reach the bottom, and we could tell when it struck. I often went to the bow and sat on the rope and could feel by the quiver that the grapnel was dragging on the bottom, two miles under us.

"It was slow business. We had storms and calms and fogs and squalls. Still we worked on, day after day. Once, on the 17th of August, we got the cable up and had it in full sight for five minutes, a long, slimy monster, fresh from the ooze of the ocean's bed; but our men began to cheer so wildly that it seemed to be frightened, and suddenly broke away and went down into the sea.

"This accident kept us at work two weeks longer, but finally, on the last night of August we caught it. We had cast the grapnel thirty times. It was a little before midnight on Friday night that we hooked the cable, and it was a little after midnight Sunday morning that we got it on board. What was the anxiety of those twenty-six hours! The strain on every man's life was like the strain on the cable itself. When finally it appeared it was midnight. The lights in the ship and in the boats around our bows as they flashed in the faces of the men showed them eagerly watching for the cable to appear on the water. At length it was brought to the surface. All who were allowed to approach crowded forward to see it, yet not a word was spoken. Only the voices of the men in command were heard giving orders. All felt as if life and death hung on the issue. It was only when it was brought over the bow and on to the deck that men dared to breath. Even then they hardly believed their eyes. Some crept toward it, to feel of it, to be sure it was there. Then we carried it forward to the electrician's room to see if our long sought treasure was living or dead. A few minutes of suspense and a flash told of the lightning current again set free. Then only did the feelings long pent up burst forth. Some turned away their heads and wept. Others broke into cheers, and the cry from man to man was heard down in the engine rooms, deck below deck, and from the boats on the water, and the other ships, while rockets lighted up the darkness of the sea.

"Then with thankful hearts we turned our faces again to the west. But soon the wind rose and for thirty-six hours we were exposed to all the dangers of a storm on the Atlantic. Yet in the very height and fury of the gale as I sat in the electrician's room a flash of light came up from the deep which, having crossed to Ireland came back to me in midocean telling me that those so dear to me, whom I had left on the banks of the Hudson were well and following us with their wishes and their prayers. This was like a whisper of God from the sea bidding me to keep heart and hope."

The rescued cable was successfully spliced and landed at Newfoundland on Sept. 8, 1866. From that date to the present time the United States has never been without cable communication with Europe.

The success of the Atlantic cables following the progress made in cable laying in European waters, gave an added impetus to submarine telegraphy, and scarcely a sea or coast was not included in more or less ambitious projects. The first French cable line between the United States and Europe was successfully laid in 1869, extending from Brest, France, to Nova Scotia. In 1871 and 1872 the Asiatic cable connecting Hongkong, Shanghai and Nagasaki with Singapore and Australia was laid. In 1873 New York was connected with the West Indies and Brazil. In 1875 a third cable between the United States and Ireland was laid and lines were constructed between Jamaica and Porto Rico. In 1878 the cables connecting England with Cape Town, with intermediate stations along the east coast of Africa were completed. A second French cable connecting France and the United States was completed in 1879, and in 1880 the lines were laid in the Gulf of Mexico.

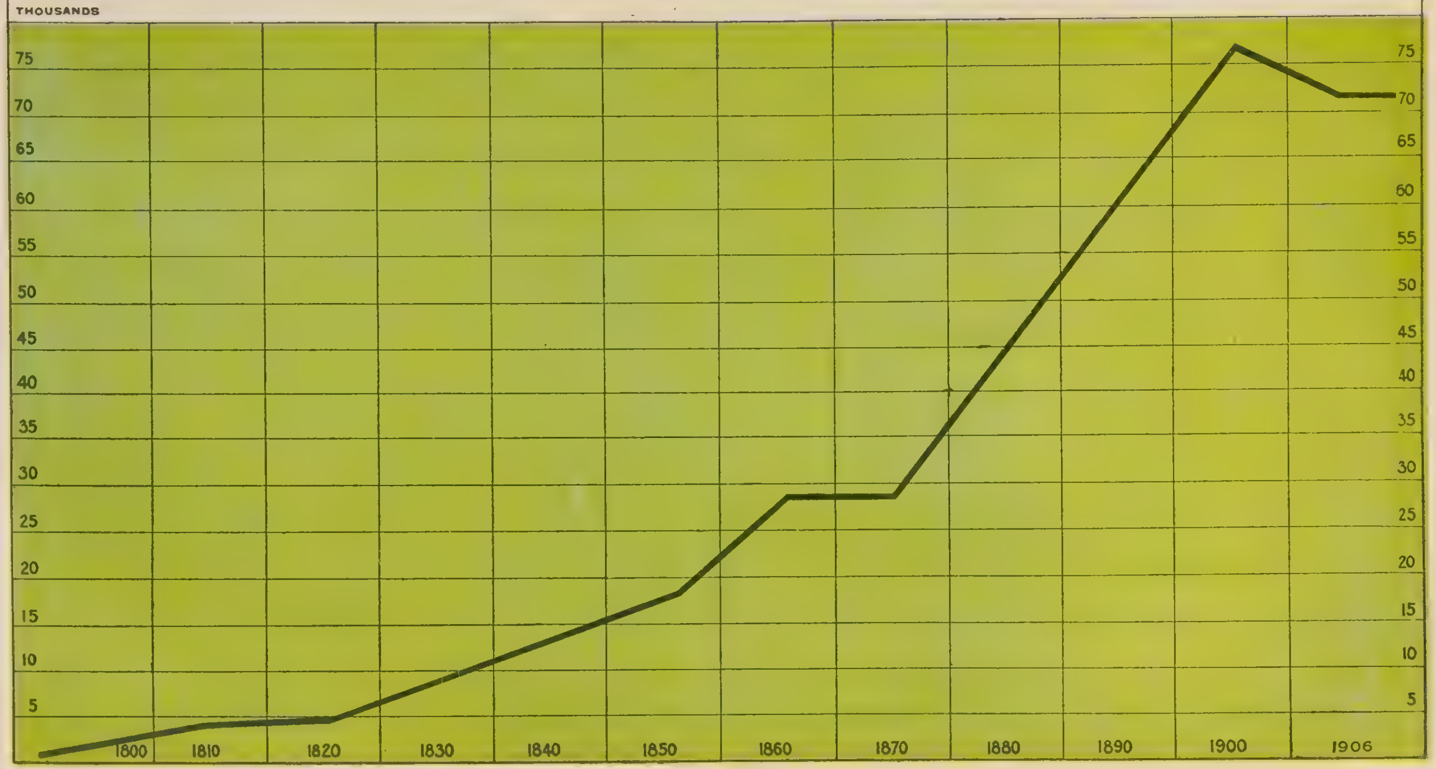
Previous to 1881 the great submarine telegraph systems in the world were in the hands of foreign companies. In that year, however, an American company headed by Jay Gould entered the field, laying two cables across the Atlantic and marking the entry of the Western Union Telegraph company into submarine competition. In 1884 two additional Atlantic cables were laid by the Commercial Cable company organized in the United States, headed by J. W. Mackey and James Gordon Bennett. In 1894 the Commercial Cable company laid two additional Atlantic cables and extended its lines in Europe.

In 1896, almost on the eve of the Spanish-American war, a cable line was laid which was destined within two years to play an important part in the conflict between the United States and Spain. The line extended from New York to Hayti, with connection thence to Santiago, Cuba, and a southern line to the Windward islands and South America, with a depth in places of 18,000 feet, the greatest at which cables had yet been laid. It was over this line that the chief telegraphic communication between the war department at Washington and the military commanders at Santiago and in the West Indies was conducted during the war with Spain, the cable lines by way of Havana being under control of the Spanish authorities in Cuba. Messages from the White House and the war and navy departments passed from Washington to New York by land line, were there transferred to the cable, thence to Cape Haytien, where they were transferred to the cable line running to Santiago which had been cut by the United States signal corps and landed at Carmanera, which was controlled by United States forces. There the messages were transferred to the land line reaching to the battlefield in front of Santiago. Messages from the war department and the White House reached the battlefield in from ten to fifteen minutes, and on one occasion during progress of the battle, a message was sent and a reply received within twelve minutes.

Up to 1896 electrical scientists and telegraphic engineers had declared that a submarine telegraph cable across the Pacific was impracticable because of the great distances to be traversed and the enormous length of cable required. In 1896, however, a commission appointed by the British govern-

POSTOFFICES

1800-1906



ment declared that a cable could be laid successfully from Australia to Vancouver, without the necessity of landing anywhere but on British soil. The decision was important because of its bearing two years later on the proposal of the American government to connect the Philippine islands to the United States by cable. The British cable project was undertaken promptly, the expense being borne proportionately by Great Britain, Australia and Canada. The line was successfully completed on Oct. 31, 1902. The longest span in the system was between Vancouver island and Fanning island, a distance of 3,561 miles—the longest line of cable yet laid in the history of submarine telegraphy.

The success of the British cable across the Pacific was the immediate forerunner of the American owned cable between Manila and San Francisco. The victory over Spain and the American occupation of the Philippines, with the annexation of the Hawaiian islands, made this cable inevitable. The capture of the island of Guam during the war and the American occupation of Wake and Midway islands, gave the United States the necessary relay stations in the long stretch of ocean between the Hawaiians and the Philippines.

It was at first proposed that the cable be constructed at the expense of the United States government, but after congress had discussed the prospect at two sessions the Commercial Cable company came forward with a proposition which the government accepted. The Commercial company thereupon constructed the line. The stations and the distances between them are: San Francisco to Honolulu, 2,276 miles; from Honolulu to Midway island, 1,254 miles; from Midway island to Guam, 2,606 miles; from Guam to Luzon, 1,490 miles; total, 7,626 miles. The line was begun on December 18, 1902, when the steamship Silvertown, with 2,413 miles of the cable on board, sailed from San Francisco for Honolulu. Before Christmas day messages flashed under the Pacific between Honolulu and San Francisco. The steamship Anglia started on May 24, 1903, from Manila, with the cable to Guam, and in the meantime the steamship Colonia was laying the cable between Guam and Midway islands. The line between Manila and Guam was completed on June 19, and the line from Midway island to Honolulu on July 3. On July 4, 1903, President Roosevelt sent, not only the first official message to Governor General Taft at Manila, but a second message which for the first time in history completely encircled the globe.

The submarine telegraphs of the world to-day number 1,500 and their aggregate length is 180,000 miles. Their total cost is estimated at $250,000,000, and the number of messages annually transmitted is more than 6,000,000. All the grand divisions of the earth are now connected by cable, and from continent to continent, and island to island, the thoughts and words of mankind are instantaneously transmitted. Beneath all oceans the universal language of the cable flows without interruption and man talks as face to face with his fellow man at the antipodes, and darkest Africa converses daily with enlightened Europe and America. Adding to the submarine lines the land telegraph system with which they are connected and through which they bring interior points of the various continents into instantaneous communication, the total length of the telegraph lines of the world is 835,000 miles, the length of their wires or conductors 3,500,000 miles, and the total number of messages annually sent over them 365,000,000, or an average of 1,000,000 messages each day.

The developments in the construction, laying, and operation of submarine cables have kept pace with their extension. From a mere gutta percha coiled wire, the submarine conductor of electricity has developed in half a century to a great cable having a central copper core surrounded by numerous layers of nonconducting material, and protected by steel wires wound spirally about it, and in turn further protected by waterproof and insect proof wrappings. From a steamer towed open barge, the facilities for laying submarine cable have developed to a fleet of fifty steam vessels, with every facility for laying, picking up, and splicing cable lines that the inventive genius of man can devise. From a speed of three words per minute, which was made on the first Atlantic cables, the speed or accession has been accelerated to fifty words per minute, while by the duplexing of the cables their carrying capacity is doubled. From a cost to the sender of

$100 per message, which was originally charged on the first cable, the rate from New York to London and the great cities on the continent of Europe, has fallen to 25 cents per word.

The submarine cable is man's greatest contribution to the commerce and government of the world. By it he commands the farthermost parts of the globe and brings the most distant points to his hand. By it he grasps the hand of mankind and binds him to himself, and makes possible the dream of centuries of a universal brotherhood of man.

THE AUTOMOBILE IN AMERICA.

BY JOHN FARSON.

[John Farson, lawyer and banker; he was born Oct. 8, 1855, at Union City, Indiana, and was educated in the public schools of Champaign, Ill., and at the University of Illinois; in 1880, after studying law in the office of J. R. Doolittle, he was admitted to the bar; the following year he entered the banking business, organizing the firm of Farson, Leach & Co., seven years later, in 1889; he is officially connected with a number of electric railways and other enterprises and is prominent in Methodist church circles and work; he is president of the Chicago Automobile club.]

For a comprehensive grasp of the automobile industry in the United States a few lines are full of suggestion: In the last census year the government took no cognizance of the business in its reports, though there are 75,000 machines of all types now in use in this country. There are more than 100 manufactories producing these machines in the United States, the automobiles averaging $1,200 apiece. The output of these factories in the last year approached $45,000,000 in value, while nearly $6,000,000 worth of foreign machines were imported, averaging close to $6,000 each. And as a feature of the rapid growth of the automobile mechanism, it may be recalled that a steam automobile, built in 1892, is treasured in Akron, O., as one of the ancient vehicles out of which, in thirteen years, the mile a minute carriage and the ten-ton truck have evolved. It was only in 1895 that the patent upon the awkward Selden machine was taken out, to be driven by an engine using hydrocarbon gas, the engine having the power to run after the driving wheels of the car were still. This Selden patent has been one of the bugbears of the automobile industry in the United States, but its strictures upon the business largely have been overcome.

To-day the manufacture of automobiles is the second most important industry in all France, while in the United States it must be anticipated that their manufacture is to make a formidable subject for the census reports of 1910. Already the steel makers of the world are making concessions to the needs of the builders and are turning out a quality of steel that shall serve the purpose of that one industry. More than 100 manufactories are making accessories designed for the American automobile, from lamps to goggles and caps. While, as to the states, counties, cities, and towns that are making laws and ordinances for the regulating of the machines and drivers, they are legion. In this respect there has been a good deal of prejudice on the one side of the general public, and on the side of the owners and drivers a good deal of lawlessness and disregard for the rights of the road. With the growth of the industry as it is promising, and with the utilizing of the machine through every field of vehicle transportation, both prejudice and lawlessness must surrender to sanity in the situation.

The American west is the seat of the industry on this side of the Atlantic, nearly 50 per cent of the machines produced coming from Michigan, in the vicinity of Detroit. With Michigan in the lead, the other states in their order are Ohio, Wisconsin, Massachusetts, New York, Indiana, Pennsylvania, Connecticut, Illinois, and Missouri. Between the licensed and unlicensed makers of automobiles last year the production of machines was about 20,000 to the one and 5,000 to the other group not paying royalties on the Selden patent. Six hundred cars were imported from France, Italy, Germany, England, Belgium, and Switzerland in the last year, each paying a duty of 45 per cent ad valorem.

New York, which has more of these imported machines than has any other state in the union, leads with a total of 17,000 automobiles of all makes, sizes, and purposes, while in 1901 there were only 901 machines registered. Massachusetts, with probably 9,000 machines, takes second place in numbers.

In the city of New York the automobile has come into more universal use, perhaps, than in any other city of the world. It has 600 cabs, scores of express wagons, a swift machine for the head of the fire department, the great touring coaches, the heavy trucks, and on down to the lightest and easiest handled small runabout. Chicago and Buffalo, N. Y., are rapidly gaining on New York, however, as the utility of the auto in the business world is becoming to be more generally recognized.

At the present time the manner in which the automobile is taking place in the great draying centers of the cities, throwing the horse out of the race and lending economy of space and cleanliness to congested streets, is one of the most striking features of its prospects. Two things in the past have been handicaps to the business automobile. In the first place, the demands for the passenger vehicles have been clamorous enough to keep the attention of most of the builders to that line of machines. And, on the other hand, the necessity for a standard automobile mechanism for heavy work at draying has been slow at developing results. Changes and improvements in the passenger machines have been following one another so rapidly that to standardize the dray has seemed superfluous. Yet it is in the coming machine which shall release the dray horse that the trade must look for great stimulus.

Almost any of the modern large cities have their ten-ton horseless trucks driven by automobile mechanism. To all purposes it is a truck just long enough and wide enough to hold the ten-ton load of the horse vehicle. But while ten tons easily may be a four-horse load, trebling the length of the wagon itself in the necessary four horses, the motor truck occupies one third of the space and makes absolutely no dirt.

Regarding the autotruck from the point of view of dependableness, economy, and adaptability, an English concern in London has made some interesting and detailed analyses of wear and tear and cost of maintenance of a steam truck of five tons capacity which had displaced two trucks requiring seven horses. This steam truck cost in the beginning about $2,500. In the first year it ran nearly 5,300 miles, carrying 3,870 tons at a total cost of $1,900 for driver, fuel, oil, and the like necessaries. In the opinion of the owners it was a question if the two trucks and the seven horses could have accomplished as much that year, as there was an abnormal rainfall and the roadways in general were bad. Yet these two trucks and the seven horses the year before had represented an expenditure of $2,600 for the work.

As tabulated by this English concern, the showing of the horse against the motor is interesting to any student of the traction problem in city or country. One of the sharp discrepancies in the motor truck cost is the fact that its operators received $170 more than did the operators of the two vans, horse drawn, and in the motor machine the entry of $350 to the account of depreciation seems more than enough as compared with the $250 for the horse outfits.

In detail, however, the comparisons of cost are:

Steam five ton truck, 1903.

Drivers' wages	$ 455.00
Carrier's wages	338.00
Repairs to truck	224.75
Oil for truck	83.20
Coal for boilers	245.00
Insurance on truck	59.50
Interest on first cost	125.00
Depreciation of values	350.00
Incidentals	22.55
Total operating cost	$1,903.00

Against this motor truck the cost of the two vans, the seven horses, and the two drivers necessary are as follows, the first cost of horses and vans being $2,000, as against the $2,500 for the steam truck:

Seven horses and two vans, 1902.

Wages, two drivers	$ 624.00
Food for horses	1,355.00
Shoeing horses	153.65
Veterinary's services	42.60
Repairs, vans and harness	55.75
Interest on first cost	102.50
Depreciation, horses and vans	250.00
Incidentals	16.50
Total cost	$2,600.00

Allowing that the wage item in the steam truck is greater than that on the horse drawn vans, it is considered that this will not long remain so, as skilled drivers of motor cars are turned out. The situation simply demands the driver of a truck, and on the face of things a man who can handle a four horse team intelligently is as skilled as any man handling a small steam engine. But in the cost of fuel and oils for the steam truck there is a saving of more than $1,000 over the feed bill for the seven horses. Of the seven horses, too, valued at $250 apiece, the mortality chance is far greater than is the accident chance to the properly driven steam motor.

In this consideration of the horse in America it has been estimated that a street car horse in New York will last an average of two years, while the dray horse has an active life of only three and a half years. And at any time that ice covers the pavements the value of the horse as a drawer of truck or dray is depreciated from 25 per cent to nothing. Under the same conditions, however, the automobile truck, rubber tired, suffers no diminution of its powers. Under any circumstances, too, the automobile truck will run miles more than the average horse vehicle. In a recent service test in an eastern city one of these auto trucks made 100 service stops in an eight hour day, carrying its load as occasion demanded. This is a test that few horse drawn vehicles could duplicate, because of the exaggerated strain upon the animals in starting the load.

Virtually the automobile business, as it stands to-day, has been built up in the last five years. A machine that is two years old this summer is likely to be a back number to the point of the well-to-do owner trying to get rid of it at a fair figure. Because of the difficulty of reaching the automobile limitations, the builders of the machines have been handicapped and the builders and the workers in the industry have suffered.

At the present time the lack of a tire that shall compare in stability and strength with the rest of a well built machine is the one great drawback to the automobile. In the past this expense annually, for tires alone, has been such that the person of ordinary means would not be able to run an automobile out of his salary were the machine presented to him without charge.

Perhaps the merchandise truck and dray have the best equipment of tires at the present time. In many cases the tires are solid rubber and may not be punctured. Some of them have worked well with a steel tire under almost any condition of the roads. But it is the belief of the automobile manufacturer that a tire finally is to be evolved which will give to the passenger machine the absolutely necessary easy, springing sweep and swing, that characterizes riding in the automobile, and that at the same time this tire material will embody the lasting qualities that must mark the rest of the mechanism.

When this shall be accomplished, the automobile industry in the United States, as elsewhere in the world, will have come in for its greatest single impulse.

THE AMERICAN SALESMAN.

BY E. W. de BOWER.

[Edward Wallace de Bower, born on a farm in the township of Vienna, Dane county, Wisconsin, May 19, 1870. Educated at the University of Wisconsin; member of the bar of that state and the state of New York. Followed the salesman's profession for several years; now vice president of John D. Morris & Company, Philadelphia.]

In the making of America there have been enlisted the heart and intellect of nearly a million men and women whose noble achievements, judged by the past, realized in the present and promised for the future, rival those of our foremost moralists and educators. This assemblage of men and women, laboring intelligently and with diplomatic persistency, has exerted an influence for good—an influence which has elevated American thought and which has established new and loftier ideals in American life. This condition is the result of having established a demand for the best, which is recognized by Americans as none too good; and of having created a desire for the beautiful, which is the American ideal. It will be universally and readily granted that Americans have the best that money can buy. They use the best implements, read the best literature, wear the best apparel, consume the best food, and cherish the Utopian in business, political and social life; in short, live the best.

> "Ever prompting—ever seeing some improvement
> yet to plan,
> To uplift his fellow being, and like man to feel like
> man."

When a condition such as this becomes apparent in a nation's life, we seldom stop to inquire concerning the causes thereof. We are inclined to content ourselves in the mere knowledge that the fact exists. This same degree of excellence, however, would not obtain, were we to eliminate the achievements of a wonderfully versatile, marvelously resourceful and highly ingenious product of heart and intellect—the

American salesman. A knight of commerce, he carries the message of trade, and by influencing the mind, establishes a demand for the best and creates a desire for the beautiful and the good in life.

To create a worthy desire is a mission which has for its goal the betterment of human conditions. He who performs this mission possesses the inherent elements of greatness, and grows in grandeur coextensive with the cause he serves. He is a benefactor of the human race. He renders a far greater service to his fellowmen than does he who merely supplies this desire, which latter undertaking too often savors of tainted enterprise. Critics have not infrequently pointed out this sordid god of commercialism. They say that Americans are a nation of traders; that their paramount occupation is the exchange of commodities for dollars. This indictment can not be rejected in toto. Yet the pursuits of the Americans, as a people, are not battles in which covetous gain is the issue. They are battles of honor against dishonor, of honesty against dishonesty, of purity of life against corrupting blight. Conquest and trade are both impelling motives; the former low, the latter high, being a peaceful and legitimate pursuit, involving high, noble, manly character. These battles have made the achievements of the American people a proud inheritance and have reared a monument more enduring than a marble shaft erected to the conquests of war, e'en though it be the product of a people who are commercially known as a nation of traders. The American salesman and the trader must in a sense be linked, for as the law graduates politicians and statesmen, so does the "road" graduate partnerships and stockholders, and not infrequently does it bestow the highest positions within the gift of the American people; for with the American salesman opportunity and independence are not myths, not remote contingencies, but living, breathing, animate facts—realities.

The American inventive genius—no longer confined to the Yankee—is continually making something useful or ornamental, more often both blended in one. So rapid is the march of invention, so quick the pace of discovery, that within six months the business world would become stagnant were the new manufactured products allowed to accumulate. Persons must be educated to appreciate the new, the unique, the novel, the useful, the ornamental. A new desire must be created with every thought which genius and talent toss into the world, and an appeal must be made to supply the ever changing, never ceasing needs of man. The luxury of to-day must be converted into the necessity of to-morrow. A market must be found, and superior ability is required to create a market for a commodity at a price in excess of its cost. America leads all other nations, not necessarily because it manufactures more, but because it sells more than any other nation. To sell is one of the greatest problems in our commercial life.

In this eager struggle for recognition and patronage, there must be found men who can influence others to purchase at a profit the goods to be marketed. These men constitute what are generally known in the commercial vernacular as selling organizations. They are well trained and skillful men, and by their industry capital is kept employed and labor engaged on the one hand, while on the other millions of dollars are put in circulation and upon mankind is bestowed the blessings of the world's yield. The salesman must understand economics and have an exact knowledge of supply and demand. He must be versed in sociology and have an insight into the relations of people, their customs, habits, modes of life, needs, etc. He must be industrious, cheerful, optimistic, magnetic. The man who can screw his courage to the sticking point, who has the majesty of earnestness and who is a zealot, will not fail. Such a man, possessing intelligence, good judgment, a sympathetic nature, tact and enthusiam, whose motto is to know and to do, will find that the field will prove "white unto the harvest."

The volume of business yearly transacted by the American salesman is incalculable, almost incomprehensible. It has been estimated at over $80,000,000,000 annually. In fact nearly the entire wealth of the country passes through the hands of selling organizations every year. The American salesman in obedience to the monitor within is the power which daily loosens the brakes and sets in motion over the net work of railroads hundreds of trains carrying goods sold. He likewise weighs anchor in every American port and sends hundreds of steamships plowing through lake, river, canal and ocean into every clime, freighted with goods sold.

The profession of salesmanship is divided into four branches: (1) the commercial salesman, (2) the specialty salesman, (3) the retail or local salesman, and (4) the promoter. This article treats specifically only of the first two classes.

In 1890 there were in this country only 59,000 commercial and specialty salesmen. In 1900 the census gave 93,000. There are now more than 100,000, the number having nearly doubled within the last ten years. There are less than 1,000 travelling sales*women*, and within the past ten years their number has not greatly increased, which fact suggests that the life of the American salesman is one too strenuous for the sensitive nature of woman. His work calls for a brave heart and a cool head, for courage and firm resolve. Many a good man otherwise has failed in this undertaking, because he had his wishbone where his backbone should have been. He must walk straight to the goal without once flinching in the line of his attack.

An analysis of 1,000 cases, representing commercial and specialty salesmen, with regard to education, and including 50 industries, reveals the remarkable fact that over 75 per cent are men of university or college training, and nearly 50 per cent of these come from the professional ranks, principally law, medicine and theology, and are drawn away from the professions primarily by reason of the increased earning possibilities in the field of salesmanship. A secondary consideration is a desire for, or the necessity of, a more active and out of door life. These two especially attractive features induce many successful men to join this constantly increasing army of itinerant philosophers. A salesman is paid for doing something which it is not known can be done, while the ordinary worker is paid for doing something which it is known can be done. Hence, the greater degree of hazard the greater the opportunities. There is always a demand for the commercial or specialty salesman. A well regulated commerce is not like law, physics or divinity, to be overstocked with hands; but on the contrary, flourishes by multitude and gives employment to all its professors. These are men versed in one or more of the fundamental, theoretical or practical sciences and who little realize the potent influence their persuasive eloquence has wrought. The American salesman mingles with his fellowmen in office and in shop, in the sunlit harvest fields of the west and in the busy factories of the east, in the cottage and in the palace, wherever the hand of man operates or the brain performs, disregarding climatic conditions, scattering ideas by conversation, preaching sound doctrines and spreading commerce, yet bearing no title and carrying no degree. He is seen on the railroad and on the camel train, in the stage coach and in the automobile. He is found in Europe, Asia, Africa, South America, Australia and the Philippines. He follows the American flag. In his wake appear industry, progress, culture and refinement. He is known as becomes true greatness, by a modest and simple name. We designate this important factor in commercial, political and social economy by the trite and significant term—a commercial traveler.

This corps diplomatique has by reason of its importance in the industrial world become a recognized factor in American politics. The late Senator Hanna publicly declared that commercial travelers were one of the most important influences contributing to McKinley's election. Since that time political managers have not only recognized this influence, but political parties generally invite the support of the commercial travelers' clubs. Railway companies and politicians reckon with this influence in shaping railway and other legislation. They are known politically as the advance agents of prosperity, or in McKinley's words the "bell-clappers of commerce." The work of the travelers' protective association and similar organizations has given them recognized standing the world over. A great esprit de corps pervades their thoughts, words and actions.

What has been said regarding the high type of the American salesman is due to the causes which make possible the truth of the statement: Whatever Americans undertake they do; and whatever they do is usually done better than the same work is done in other countries. These causes briefly stated are, first, the versatile nature of the American; second, the realization that preparation for any work is not only essential to a large measure of success, but this preparation must be applied and it must be continued. In order to grow, one must study unceasingly. Michael Angelo, when an aged man, said "I carry my satchel still," meaning that his life was a perpetual study and a continuous and applied preparation of one thing. Expert, specialty and authority are only synonyms of "I carry my satchel still."

"The man who seeks but one thing in life, and but one,
May hope to achieve it before life is done,
But he who seeks all things wherever he goes,
Only reaps from the hopes which around him he sows
A harvest of vain regrets."

Adaptability, plus applied preparation, is a formula which explains much of the success of which we hear and read. It has been well said that the gate of incapacity opens on the road to failure. Fate seldom makes league with the unprepared.

The American salesman is regarded in America as a highly respected and influential type of citizen, while the European salesman is frequently referred to as a "bag man." One of the reasons for this is suggested above, and it might be added that the American salesman is especially trained. He appreciates that a knowledge of human nature implies sympathy with human nature, which follows an understanding of environments, conditions and motives. If one can command another's view point, the common chord of human sympathy has been struck.

He holds the attention by the winning of confidence. He distinguishes between self reliance—a positive knowledge of one's actual powers—and self conceit—a false conception of one's ability to do things. He is taught to arouse a consciousness of values and to analyze the kind of interest thereby produced and how to apply this interest to the accomplishment of the end sought. He is taught to convince by reason, to influence with emotion, to govern by will power—that power which when exerted carries everything before it—and the world has never stayed its progress. He knows how argument acts on the objective mind— the mind of reason; and how external suggestion acts on the subjective mind—the mind of feeling and emotion. This training, if it is not received through one of the many schools for salesmanship in America, is the result of that preparedness which comes from observation, conversation, reading and reflection.

The philosophy of salesmanship contains principles which underlie and direct the art of selling. These the American salesman masters in addition to his knowing the origin, evolution, manufacture, consumption, supply, demand, utility and potential value of the line which he sells. The European salesman merely follows the beaten path of technical knowledge of the product sold, and stops at this point. Here the American bids adieu to his foreign competitor; he travels beyond this mere concrete and technical knowledge. He enters the long lane of psychology from which no man returns with out having gathered some of the threads of human life.

The American salesman has briefed his case. He learns human nature from contact with it. He analyzes each person the instant he approaches him and determines whether the subjective or the objective mind predominates, and then decides upon his presentation. He has reduced salesmanship to a science and resolved its elements to canonical form. With him an order is only the result of four distinct and successive mental operations. He reasons thus:

That any action, whether it be the signature to an order-blank or the act of gazing at a skyscraper, depends upon Resolve, which is the result of Desire, growing out of Interest having its origin in Attention, which confidence begets. Therefore every time a sale is made, the mind passes through these four states of consciousnesss: (1) Attention, (2) Interest, (3) Desire, (4) Resolve.

The American salesman's early plaything has been Attention. He has made platonic friendship with Interest. He has summered and wintered with Desire. He carries many an honorable scar from contact with Resolve. He is scientific, yet always simple. He can instantly discern on a countenance the sanction of the meeting of minds and can as quickly detect on the same countenance a danger signal. His study of life through observation enables him to place right values upon men—to distinguish between the genuine and the false.

He reads in every face a line, a page or a book, and to him this reading is the greatest study in the world. He has the psycological knowledge which enables him to snatch victory from defeat. He is a skilled physiognomist and also a practical psychologist, understanding the mental operation of the mind and influencing it to a marked degree.

If in order to make a sale, the course lies through the mental process of reason, he develops the motive for resolve by argumentation, and presents his case with convincing facts and with logical sequence. He becomes a logician, and from an accepted premise builds to another, piling one conclusion upon another, demonstrating by example and deduction, thereby creating desire until:

> "Resolve me, Reason, which is worse of these—
> Want with a full or with an empty purse."

If in order to make a sale the course lies, as it not infrequently does, through the mental process of feeling, emotion or impulse, then he directs the motive for resolve by calling to his assistance the psychology of suggestion. He then assumes the role of a lawyer addressing a jury—the prospective customer. He plays upon the jury's feelings, sympathies, pride, sentiments and emotions, complimenting and diverting, alternating with tempting and coaxing, never manifesting anxiety and never forgetting to say something either in mute or spoken eloquence about the good qualities of his client—the thing he is selling. His speech is always interesting and always delightful; it instructs the hearer and gives him a sense of delight and satisfaction by reason of the art which is applied in the telling. It is acquired largely by constant thought and frequent repetition—by keeping green the words of Michael Angelo. The world welcomes a man who has something to say and is able to say that something well—a convincing talker always commands respect, sounds the note of admiration, and by that fine sense that men call courtesy wins a passport round the globe. The salesman's tact, keen judgment and rare good sense teach him that if he says something nice about his prospective buyer's business, he can generally get the prospective buyer to take an interest in what he has to say about his own business.

THE EXTENSION OF OUR DOMESTIC AND FOREIGN TRADE.

BY GEORGE BRUCE CORTELYOU.

[George Bruce Cortelyou, postmaster general of the United States; he was born July 26, 1862, in New York, and was graduated from the Hempstead institute of Long Island in 1879 and from the State normal school of Westfield, Mass., in 1882; the following year he became a general law and verbatim reporter in New York, continuing until 1885, when he was principal of preparatory schools of New York until 1889, when he entered public service; since then he has been private secretary to government officials, such as the postoffice inspector of New York, surveyor of the port of New York, fourth assistant postmaster general; stenographer to the president in 1895; executive clerk one year later, and in 1898 assistant secretary; in 1900 he became secretary to the president, remaining until 1903, when he was appointed first secretary of commerce and labor for the United States; resigned to become chairman of the republican national committee in 1904; appointed postmaster general 1905.]

There has never been a time in the history of this country when so much interest was taken in commercial and industrial conditions as at present. With the expansion of our territory has come the expansion of our trade. We believe that the necessary expansion of territory has been attended by no sacrifice of the principles upon which the government was founded and with no menace to our future welfare. The same must be made true of the expansion of our trade. The founders of the republic builded wisely, and however great may be the development on commercial and industrial lines, there should be no deviation from the great fundamental principles, adherence to which has been the safeguard of our institutions. Some time ago, I referred to what is termed the "commercialism" of the age in which we live. Let me recall what I then said:

"In these prosperous times we hear much of the term 'commercialism.' It is frequently referred to as though in itself it represented a misguided national spirit or a tendency of our people to lower their standards. There is, undoubtedly, a commercialism that would dwarf the national life; that would place business success above business honor; that would contemplate the profits of trade without the ethics of trade; and that, if followed to a large extent, would make the American name a shame and a reproach among the nations. But there is another commercialism that is founded upon the traditions of the fathers; that seeks to secure the markets of the world by the American traits of thrift and fair dealing; that weaves into every fabric, as a prime essential, a moral fibre; that combines the fine qualities which have made the names of our really great merchant princes and leaders in the business world synonyms of honor and integrity. That is the commercialism with which you and I wish to ally ourselves, for the nation that is devoid of that spirit to-day sits supinely while her competitors pass on to the goal of commercial and industrial supremacy. Let us dedicate ourselves, not to the warped and sordid and altogether false commercialism that would gain success at all hazards, but rather to the true commercialism that is worthy of our best American ideals.

"It is easy to start a word or a phrase on its rounds, that is later to be taken up, written about, and preached about; and it seems to me this is as good a time as any to place ourselves on record on the right side of this proposition and have the eminent gentlemen who are such ready critics and prolific controversialists understand that there can be a commercial spirit in a great nation so fine and so true that it becomes a support for the best tendencies and best possibilities of the national character; and that we do not intend that this spirit shall be misrepresented by any sweeping generalization or by a failure to recognize the fact that among the greatest of the forces that have made this republic what it is to-day are the men of commerce and industry."

My remarks contemplate this true commercial spirit as an essential basis for a consideration of agencies for the extension of our domestic and foreign trade. Upon that foundation, what are some of these agencies?

First, there must be the initiative and energy of the individual merchant, and co-operating with the individual merchant must be his employee, for the initiative and the energy of the one must be supplemented by the faithful service and devotion of the other. Granting this, we find ourselves at the very outset confronted with the great question of the relations of what are called capital and labor. Labor and capital must work together, must reason together, must be tolerant and open minded if they are to achieve the goal of their mutual desires. Men naturally differ among themselves in their opinions on this subject, but very often their differences are found to show but slight divergence from a common ground. The man who seeks to accentuate these differences for political or personal advantages will ultimately receive the condemnation his mischievous teachings deserve. The demagogue is always with us. Whether in the ranks of capital or labor, whether in one political party or another, he is an impediment to progress and a menace to free institutions. In spite of him and in the interest of good government, the problems that are essentially nonpartisan must be sacredly kept so. Not that we should minimize the dangers along our pathway, not that we should abridge the freedom of speech or of the press in the discussion of wrongs that must be righted or of evils that must be eradicated, but running through the whole discussion must be a spirit of fair play and common decency. It is not necessary that one should be a pessimist to recognize the evil tendencies and forbidding influences that menace the national welfare. We are not naturally a nation of pessimists. The founders of the nation breathed the very spirit of optimism, and, while recognizing that this government, like all human devices, had its imperfections, and that dangers and difficulties were inseparable from the working out of its destiny, the great leaders of American thought and action from the days of Washington to the present moment have carried aloft the banner of a national hopefulness and have been sustained and strengthened by a firmly rooted belief in the integrity and greatness and glory of this mighty republic.

Among the problems confronting our people to-day, none is more worthy of serious attention than that relating to commercial and industrial conditions. I believe that we are making progress. I believe that there is to come better feeling between employer and employee. I believe that the organizations and individuals representing the men and women of wealth, and the men and women whose toil makes the accumulation of wealth possible, are exercising an ever-increasing influence for better feeling; and the American Academy of Political and Social Science and others of kindred purposes, chambers of commerce, boards of trade, and commercial organizations generally—great unofficial agencies for the extension of American commerce—are doing much vital work in that direction.

To repeat: first, individual initiative, energy, and loyalty upon the part of the citizen, whether employer or employee; then, in co-operation with them, the agencies of government, and, at this time, most appropriately, the new department of commerce and labor created to have some jurisdiction over commercial and industrial affairs.

Turning to the federal agencies, we find that nearly every branch of the government does important work for commerce and industry. The department of state in negotiating treaties promotes the development of commerce, while the work of the consular service, the results of which are now given to the public daily, by the department of commerce and labor, is almost exclusively devoted to commercial interests. The army of the United States, for which many millions are annually appropriated, although intended primarily as an instrument of war, is, in fact, an important agency for the upbuilding of commerce, since it is under the jurisdiction of the war department that the vast appropriations for the improvement of rivers and harbors are expended. The navy is also an important factor, not only by way of protection to our merchant marine, but also in its work of exploration, in the laying out of cable routes, and in many other ways. The postoffice department, with its expenditure of over one hundred million dollars per annum, is an invaluable agency for commercial development. The department of the interior is another, through the aid which it gives our citizens to establish homes and to become producers of agricultural and mineral wealth; and particularly in the encouragement which, through the administration of the patent laws, it gives to the inventive genius of the country. The department of agriculture, for which nearly forty million dollars have been appropriated during the past decade, is engaged in promoting and fostering our principal source of wealth, agriculture, whose products form such a large part of the materials entering into our commerce, both internal and external. Of our total exports, which now exceed those of any other country of the world, agriculture supplies nearly, or quite, two-thirds. The department of justice, in enforcing the various laws against the restraint of trade, and the treasury department, in administering the finances of the country, are also potent factors in our commercial progress and development; and in conjunction with these departments the department of commerce and labor will contribute its share to the maintenance of our commercial and industrial pre-eminence.

Congress has declared it to be the province and duty of the department of commerce and labor to "foster, promote, and develop the foreign and domestic commerce, the mining, manufacturing, shipping, and fishery industries, the labor interests, and the transportation facilities of the United States."

One of the most important methods of aiding commerce is to give to those engaged in it such definite information regarding existing conditions as will enable them intelligently to determine the classes of articles which can be most profitably produced, the sections to which they should be distributed, and the agencies through which they can best be placed before prospective customers. In all of this work the new department is actively engaged.

The census bureau, which in the year 1900 gathered the statistics of population, manufactures, and agriculture, is now engaged in collecting and compiling information on other subjects having important relation to our industries, and is also preparing to take, a year hence, another census of our manufactures, thus giving a quinquennial instead of decennial statement, which in the past has been our sole information on the subject of manufactures. In addition, its statistics on cotton production are now presented at frequent intervals, and in conjunction with special investigations ordered by congress, it is giving to the country a fuller knowledge of the great factors of our commerce than ever before.

The bureau of statistics of the department publishes, for the benefit of our commercial interests, such information as it is able to collect with the co-operation of the various governmental offices and commercial organizations. It also gathers and publishes from month to month statements of the concentration of the principal articles at certain internal points and their transportation therefrom to various parts of the country and to the seaboard for exportation. This work, a comparatively new one, is carried on by the bureau largely through the co-operation of commercial bodies, the press, and the large organizations engaged in transportation. In like manner information is collected and distributed regarding exports and imports. Material for use in manufacture is forming a steadily growing share in our imports, while the home markets for articles in a form ready for consumption is more fully supplied year by year by our own producers and manufacturers. Manufacturers' materials in 1860 formed 26 per cent of our total imports; in 1880, 37 per cent; in 1900, 46 per cent, and in 1903, 48 per cent, while the imports of articles manufactured in a state ready for consumption have decreased in about the same proportion.

Monthly statements of the total exports of the various articles of production and of the countries to which exported are presented by the bureau of statistics and distributed to individuals and to commercial and industrial organizations. In addition, statements are issued at the close of each fiscal year showing the distribution by countries of every article exported and the quantity and value sent to each country during each year of the previous decade. Semi-weekly statements of commercial conditions are prepared and distributed to the press and to commercial organizations, thus giving the widest possible publicity to the latest available information regarding commercial conditions.

Still another important undertaking of the department is the publication and distribution of commercial information collected by the consular service of the United States—a service composed of more than 300 men scattered throughout the world—who report regularly upon the opportunities for American commerce in their respective districts. These reports are forwarded by the consuls through the state department to the department of commerce and labor for publication and distribution. In addition to the information thus obtained, the department of commerce and labor from time to time calls upon the consuls for special information for which inquiry has been received from merchants and manufacturers. The consular reports are issued daily in printed form, and distributed to the press, to commercial bodies, and to a limited number of individuals. It is through this service that the American commercial public is kept in close and constant touch with trade conditions and opportunities throughout the world.

Another valuable agency is the bureau of labor of the department. Its investigations are not confined to conditions in the United States, but are extended to other countries and to the relations which labor conditions there bear to production and commerce and labor in the United States. The information thus obtained is published periodically and widely distributed.

Other branches of the department's work in the interest of commerce and industry include the lighthouse establishment with its thousands of employees engaged in maintaining aids and safeguards to commerce on the coasts and inland waterways; the coast and geodetic survey with its corps of skilled men engaged in surveys of our coast; the steamboat inspection service, which contributes largely to the safety of persons and capital engaged in commerce by water, both along the coast and upon the interior waterways of the country; the bureau of navigation, which has to do with matters relating to the shipping interests of the United States; the bureau of fisheries, which in promoting the development of our fresh and salt water fisheries contributes largely to the food supplies entering into the commerce of the country; the bureau of immigration, which protects the country against violations of the laws governing immigration; and the bureau of standards, which is intrusted with the care and use of the national standards of measure, with the development of methods of measurement, and with the dissemination of knowledge concerning these subjects as applied in the arts, sciences and industries.

Of the new bureaus created by the act establishing the department of commerce and labor, the bureau of corporations is engaged in the necessary foundation work for its duties under the law, and will eventually become a valuable agency for the extension of our domestic and foreign commerce. The bureau of manufactures is not yet organized, owing to lack of appropriations. Funds available in present legislation will make possible an early beginning of the work of this bureau.

Provision has been made for special investigations of trade conditions at home and abroad, with the object of promoting the domestic and foreign commerce of the United States, and for other purposes. Important instruments in the promotion of trade are the agents dispatched from time to time by foreign governments to study commercial opportunities in other countries. Military and naval experts are sent abroad by our government to report on conditions that are of interest to their respective departments. In the daily competition of international trade there is even greater need of intelligent outposts abroad. Special agents are also required in the department itself to inspect the branches of its services in different localities and to secure uniform, businesslike and economical methods. The need of such agents in other departments has been met by appropriations, and there is of course a similar need in this new department.

In addition to the measures that have been taken for the reorganization and improvement of existing branches of the statistical service, it is proposed to establish an office for the collection and distribution of foreign-tariff information, this being one of the directions in which the department's work can apparently be extended with great advantage. A small initial appropriation has been received for this purpose.

Nations are inclined to regulate their commercial intercourse by means of a double system of tariffs, permitting preferences through commercial treaties. The current agitation in Great Britain for a departure from traditional policy in order to increase commerce between the members of the

British empire may have marked effects upon American trade and incidentally upon American labor.

The promise held out for the new department presupposes proper equipment. As it demonstrates its usefulness, I am confident congress will increase its appropriations to a point adequate to its needs. Like all new institutions it is bound to have its early struggles for recognition. Congress and the chief executive have given it work to do. Whether well or ill equipped, it will do this work in the best manner possible. It seeks nothing it should not have. It will ask for support only on its merits, but as it demonstrates its usefulness in the scheme of our government, it will have whatever recognition and commendation it may be entitled to receive.

The new department has to deal in a large way with great business enterprises. It has approached these problems with conservatism and impartiality. It has some jurisdiction over the interests represented by the toilers of the country, and it will do its share in securing a recognition of labor's rights and the encouragement of better feeling and fairer dealing. It is made the statistical department of the government, and it will make its statistics nonpartisan, impartial, and as accurate as they can be made. It has to do with marine interests. It will lend the weight of its influence to the building up of the American merchant marine. It has supervision over the difficult problems of immigration and Chinese exclusion. There are inconsistencies in the laws relating to them. There are grave hardships constantly coming up in the execution of these laws. Not infrequently they present obstacles to the development of our commerce. But they are founded on the good old doctrine of self preservation, and must be fairly enforced until more satisfactory legislation can be devised. These and the other problems to the solution of which the department must give its best energies are among the most important confronting our people to-day. If the department can do its legitimate share in their solution, if its personnel can be raised to a high standard, if its expenditures can be kept at the lowest figure consistent with good administration, if, in a word, it can be conducted as a business establishment for the advancement of business interests and for the encouragement of good feeling and better understanding between all interests having to do with our trade and industrial relations—the employer and the employee, the accumulator of wealth, and the toiler in the counting room or the shop or the factory who contributes to it—if it can be a potent force for enlightenment and progress in these busy years of the nation's development, all who have an interest in its success will feel that their confidence has not been misplaced and that they have contributed to the establishment and advancement of a factor in our national life.

The new department, as it takes its place by the side of the other great executive establishments, will catch the step and the swing of their onward movement in the nation's progress and prosperity. In all the work of the new department, in its desire for nonpartisan and impartial and conservative action, in its contribution to the solution of the problems with which it has to deal, it has had no more sturdy friend, no more vigorous advocate, no more faithful supporter, than the strong and able and fearless man who is to-day president of the United States.

This country has taken its place in the front rank of the world's producers. It now excels any other country in the production of wheat, corn, iron and steel, coal and copper, and possesses more manufacturing establishments and a larger number of intelligent, well paid workmen than can anywhere else be found. Our locomotives, railway cars, carriages, agricultural implements, boots and shoes, clocks, scientific instruments, telephone and telegraph instruments, and a multitude of other products which go to every quarter of the globe are a tribute to American skill and enterprise.

What I have referred to are, in the main, the forces to which we may look for still further progress and development in our commercial and industrial relations, but back of them all there must be triumphant Americanism, forceful and far-seeing, ever aggressive and ever mindful of the principles upon which our national progress depends. On the integrity, and energy, and public spirit of American citizenship we may confidently rely for the future glory and prosperity of our country.

3 6655 00107724 6

HC 103 .L25 v.4
LaFollett ... bert Marion,
1855-192
The maki

HC 103 .L25 v.4
LaFollette, Robert Marion,
1855-1925,
The making of America

DATE DUE	BORROWER'S NAME

Concordia College Library
Bronxville, NY 10708

INFORMATION
ICI